Innovation Labs in Healthcare

A Review of Design Labs as a Model for Healthcare Innovation

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Abstract

Healthcare is facing an uncertain future. People are living longer, costs are rising and patients are demanding a different experience. Over the past 15 years, a growing number of health systems have built in-house innovation labs to survive (and thrive) in this emerging world. Often enabled by design, it was the emergence of these labs that prompted interest in examining them further. Using a qualitative approach including expert interviews, this research explored 17 hospital based design labs around the world. It is hoped that this research may be used by others seeking to advance health design in their own organizations and to provoke discussion and thought on the use of design in the context of healthcare innovation. Outputs of the research include a Synthesis Map of the findings and a Health Design Lab Canvas. The Health Design Lab Canvas is accompanied by design principles for consideration when building a health design lab in a healthcare organization.

Acknowledgements

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Dad - And to my late Dad, this one is for you! I wish every day that you were still here to see it! THANK YOU!

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“Design doesn’t neatly fix things but it gives you permission to make things better. It allows you to break rules and find solutions that do not currently exist. Nobody ever changed an industry by simply making what exists slightly better.”

- *Quote from Interview*

Chapter 1 – Introduction and Research Methods

Healthcare systems globally are striving to improve quality and the patient experience while also managing population health and lowering costs. (IHI, 2018) Many of these systems have a history of improving services using quality improvement tools from other industries such as Lean or Six Sigma. Today's problems, though, are at a scale that requires new thinking and approaches to transform health care. (Bevan and Fairman, 2011) This transformation will require a focus on new ways of managing change that allows organizations to develop and adopt innovations and the ability to spread and scale them when they are proven successful.

Innovation is now the new buzzword in healthcare as health systems struggle to keep pace with the demands placed upon them. Definitions of innovation are not universal and many healthcare centres have linked traditional research or quality improvement initiatives to their innovation agenda. (Naylor, 2015) Others, though, are looking at new methods to inspire innovation with design being one that is becoming more accepted across the world. (Xie, 2011)

Over the past 15 years, a growing number of hospitals have focused upon building capabilities in "innovation" to survive (and thrive) in this emerging world. (Herzlinger, 2006) Kaiser Permanente has shown early success in leveraging design methods to spur innovation in healthcare. (McCreary, 2010) The Mayo Clinic's Innovation Lab has had success in leveraging human centered design to improve the patient experience and transform their systems of care. (Xie, 2011) Others have opened design labs that serve as innovation centres while supporting more traditional improvement activity in the hospital. (Hendriks, 2016) Design-led innovation labs are showing early signs of success as a solution that many leading organizations are supporting.

This work identified 17 hospitals from around the world that have developed design led innovation practices most commonly referred to as “design labs” as a core vehicle for driving innovation in the organization. These labs exist to develop new, more experimental (hence “lab” ways of thinking, creating and caring, which differs from more traditional methods healthcare organizations have used to make change happen. (Davis, 2017 While the use of a design lab has been well established by these early adopters, each lab has a different focus for their work and models of how they will achieve impact.

Project Purpose

The purpose of this project was to study the design labs’ purpose, place, impact and future within a hospital to better understand whether ‘labs” may be an effective model for innovation in healthcare. The intent of the work was to be able to better understand how a health design lab functions. Insights from this research were distilled into a Synthesis Map that visualizes the findings and frames the lab in the context of a health design ecosystem. The map may be used as an analysis tool for hospitals interested in investing in a lab or as a sense making tool for designers, clinicians and leaders to better understand how the health design lab functions in a hospital.

Lastly, a Health Design Lab Canvas was created using Osterwalder’s Business Model Canvas. Accompanying the Health Design Lab Canvas are eight design principles to consider in building a new health design lab. It is hoped that together the Synthesis Map, Health Design Lab Canvas and the accompanying design principles may allow this research to be used by others seeking to advance health design in their own organizations.

Research Question

Are design labs an effective model for health innovation?

Definitions

For the purposes of this work, key definitions and their sources are as follows:

1) Human Centered Design (IDEO, 2016)

In order to frame conversations around the use of "design" in healthcare, a working definition was used to level set understanding of what is meant by design. IDEO has used "human centered design" as a formal approach to invention and innovation for many years. Their definition was cited when people asked what was meant by design or how design was framed within the context of this work. It was also the definition used to seek out labs that were using design in healthcare.

"It's a process that starts with the people you're designing for and ends with new solutions that are tailor made to suit their needs. Human-centered design is all about building a deep empathy with the people you're designing for; generating tons of ideas; building a bunch of prototypes; sharing what you've made with the people you're designing for and eventually putting your innovative new solution out in the world."

2) Design Lab (Jonathon Romm, Institutt for Design, Oslo Norway)

The concept of a "design lab" has been adopted in many healthcare settings but has been loosely defined. To study the use of these labs a definition is needed. Jonathon Romm from the Institutt for Design in Oslo is currently completing a PhD in the use of design labs in organizations around the world both in and outside of healthcare.

His definition is: "*Embedded design labs are temporal entities, within organisations that utilise design knowledge and capacity to enhance innovation processes." (Romm, 2017)*

This definition is used in the research to frame the study of a concept commonly referred to as design labs. The research reveals that although not all labs interviewed have a formalized space, each lab leverages or uses design to enhance their innovation processes even if it is a lab that is not confined to a single physical space.

3) Health Innovation (World Health Organization)

Innovation is another word that is often loosely defined in healthcare and often used interchangeably with improvement or the generation of new ideas. As many of the questions used in the interviews in this research revolved around innovation, it was important to use one definition of healthcare innovation consistently. The World Health Organization provides this definition of innovation:

"Health innovation is to develop and deliver new or improved health policies, systems, products and technologies, and services and delivery methods that improve people's health." (WHO, 2016)The WHO definition incorporates both the development of new ideas along with their implementation. It also incorporates the concept of value through the improvement of people's health. Innovation helps make things better or improved from the current state.

4) Quality Improvement

Quality improvement in health care has been a core process in most health organizations for over 20 years. Based on principles originally developed in manufacturing, health care organizations have spent large sums teaching teams QI methods to optimize performance and deliver better value.

The following definition of QI was used:

"…the combined and unceasing efforts of everyone—healthcare professionals, patients and their families, researchers, payers, planners and educators—to make changes that lead to better patient outcomes (health), better system performance (care) and better professional development." (Batalden, 2007)

Research Methodology

To explore design labs in the context of health innovation, this project used a qualitative approach including expert interviews with 32 design labs around the world. (For list see Appendix C) Labs were chosen based on an environmental scan of design practices in health care organizations and with input from the advisory panel for this work. The panel consists of leaders in the health care field including:

- **Kate Sellen**, Director of Design for Health Program at OCAD University
- **Zayna Khayat**, Futures Strategist, Saint Elizabeth Healthcare, Toronto Toronto and Adjunct Faculty, Rotman School of Management Health Sector Strategy Center, University of Toronto
- **Josina Vink**, Researcher and PhD Student, Experio Lab, Sweden
- **Anne Trafford**, CIO, VP, Quality and Performance, Providence Healthcare, St. Joseph's Health Centre and St. Michael's Hospital

The interviews leveraged a semi structured format consisting of a standard set of questions that was shared before the interview with each expert (Appendix B). Each interview was between 45 – 60 minutes and took place via phone, videoconference or in person. The data from the interviews were coded using NVivo software and thematic analysis was done using a single coder. The study was approved by the OCAD University Research Ethics Board and all participants provided informed consent (Appendix A) prior to completing the interview.

The following hospital-based labs were interviewed for this research:

Canada

Baycrest Innovation, Technology and Design Lab, Toronto, ON – Bianca Stern, Executive Director

Healthcare Human Factors Lab, UHN, Toronto, On – Joe Cafazzo, Executive Director

UHN Open Lab, Toronto, Ontario – Tai Hyunh, Creative Director

United States

Carolinas Health System Innovation Engine, Raleigh, NC – Ann-Somers Hogg, Director of Innovation

Cedars-Sinai Medical Center, Los Angeles, California – Joseph Castongia, Associate Director, Human Centered Design

Connected Health Innovation – Partners HealthCare, Boston, MA – Jodi Sperber, Senior Scientist, User Centered Design

Health Design Lab @ JeffInnovation, Philadelphia, PA – Robert Pugliese, Associate Director

Kaiser Permanente Design Consultancy, Oakland, California – Estee Neuwirth, Senior Director, Innovation and Design

Mayo Clinic Center for Innovation, Rochester, MN – Dr. Douglas Wood, Medical Director

MD Anderson Innovation Centre, Houston, TX – Denise Worrell, Director of Human Centered Design, Innovations

Penn Medicine Center for Health Care Innovation, Philadelphia, PA – Matthew Van Der Tuyn, Manager, Design and Strategy

Sibley Innovation Hub, Sibley Hospital, Washington, D.C. – Frankie Abralind, Experience Designer

Sutter Health Design and Innovation, Palo Alto, California – Megan Moyer, Director, Innovation and Design

University of Vermont Medical Center Design Lab – Jeremy Beaudry, Lead Healthcare Experience Designer

Europe

Center for Innovation, Karolinska University Hospital, Stockholm, Sweden – Anna Thies, Senior Healthcare Service Designer

HELIX Centre, London, UK – Gianpaulo Fusari, Senior Designer

Australia and New Zealand

Design for Health and Wellbeing Lab, Auckland, NZ – Steve Reay, Co-Director

A map to all participants in this research is found here - https://drive.google.com/open?id=1WPLi_j9nJ4WtKdNCjjtLl4bDe-x-ZtDD&usp=sharing

Approach to Data Analysis

To analyze the data collected, a sense-making process was used to understand data patterns within the core theme areas of the research questions.

- *Which questions were, on aggregate, perceived to be critical by individuals?*
- *Which questions were often associated with others? What relationships exist when demographic filters are applied?*
- *Where are the biggest differences between design labs that have been around for 5 + years and those that have not?*

Building on this approach to data analysis, a variety of analysis techniques were used to understand the quantitative and qualitative data collected. These techniques included:

- Sorting data to understand patterns and trends;

- Visually representing responses to understand the data in new ways;
- Clustering responses to detect similar and dissimilar attributes.

Synthesis Map

Building on insights gathered through the interview process and data analysis, a synthesis map was created. The map is intended to visually explore the insights from this research and to support the analysis described above. It is envisioned that the map will provoke discussion and thought on the use of design labs in the context of healthcare innovation.

Synthesis maps evolved from OCAD University's Strategic Foresight and Innovation pedagogy necessary to train students in systems thinking. Synthesis maps are typically designed as communicative artifacts that translate multiple knowledge perspectives about social systems to illustrate the dilemmas and challenges within a complex system scenario. These are "first phase" system maps that synthesize research, perspectives, and design problematics into coherent visual narratives that make sense to stakeholders knowledgeable in these domains.

Business Model Canvas

The Business Model Canvas (Osterwalder, 2010) is a strategic management template for developing new business models or documenting current ones. It is a visual chart with elements that portray a business' V*alue Proposition*, infrastructure, customers and finances. It was initially proposed by Alexander Osterwalder and has since been used as a tool for developing new businesses or analyzing existing organizations. The Business Model canvas was used to inspire the creation of the Health Design Lab Canvas. This is a tool that may be used by anyone looking to create their own health design lab or to reassess the value and work of an existing lab. The tool that was developed is a prototype . If health design leaders find utility in its use, the tool may

be used to share approaches towards using design in hospitals and other healthcare organizations. It is licensed under Creative Commons for anyone to share and use. Its hoped that this may become a prototype that is tested and iterated on as design advances in its maturity and use in healthcare settings around the world.

Study Limitations

The following limitations are acknowledged:

Single Coding

The primary research process could have been amplified by producing a more complex approach to data analysis. Data was coded using a single coder (the author); reliability of results could be enhanced by adding a second coder, however this was not possible with resources available for this research project.

Research Methods - Interviews

Interviews were the primary resource for understanding the design lab. Inherent in this process is a bias towards the lab based upon the lived experience of the person being interviewed. Most people interviewed were the directors of the labs themselves and secondary interviews were not conducted. While a bias may exist, the author did feel that all interviewees were transparent with the information shared. To minimize the bias, additional expert interviews could be conducted with other staff in the labs, stakeholders involved in working with the labs, patients and families that have been involved in co-design processes with the labs and other leaders in the organizations.

Hospital Bias

Interviews in scope for the final analysis consisted solely of labs embedded in hospitals. There is an inherent bias towards a hospital perspective in analysing this data that should be acknowledged.

Chapter 2 – Interview Results

Interview data for this project provided insights into organizations, teams, and individuals who are using design labs as a primary methodology to improve or innovate in their organizations. Whether their frame was transformational change or local improvement, the intent was to move to a better future through the use of design. In this section, the results of the research are shared to reveal key insights and patterns in the data.

Interviews focused on the following areas:

Purpose

• Description of the Lab;

• Rationale for Use;

• Innovation Focus – Process or Outcome

• Barriers to Innovation

• Funding

Place

• Internal and External Relationships;

• QI and Innovation

Impact

• Strategy and Intent

• Reporting Structure

• Metrics of Success

• Outcomes achieved;

• Ambition and Maturity

Future

• Values;

• Future of Design;

• The Health Design Lab Canvas

• Design Principles

While 32 design labs were interviewed in total, only those labs that had a design capability housed in a hospital were included in the analysis. (N = 17 The rationale was that these labs are embedded in either public or private hospital systems which allows for a specific and somewhat comparable focus in the analysis. Although this represents a bias towards data generated from hospitals (see prior section on limitations of this research, it was important to first understand this type of lab before moving outside of it in future research.

The following analysis describes findings in each of the domains followed by insights that were identified after the data was analyzed and patterns emerged. The accompanying synthesis map visualizes the data and analysis focusing on four areas for consideration amongst these labs; purpose, place, impact and future.

1. Purpose

The lab's purpose revolves around how it is structured to achieve its desired outcomes. This includes basic demographics of the labs, the rationale for the lab, innovation focus, barriers to innovation and funding.

Lab Demographics

Data gathered about the lab included its name, age, number of staff, skill

mix, and how it is funded.

Age

This question sought to determine how old the labs were to gauge the maturity of design labs in health care organizations. Findings indicate that the concept of a design lab embedded in healthcare organizations is relatively new, and although the oldest lab interviewed dates to 2003, more than half of the labs interviewed began after 2012. Many labs spoke to still finding their identity or to viewing the work itself as a prototype evolving over time.

Age

1 - 5 years	6 - 10 years	11 years plus
7	*7*	*3*

Size

Labs were asked about their size as measured in staff on their payroll or equivalent full time hours. The distribution in size varied from very few people on staff (1 or 2 people) to three labs that had more than 25 full time staff. The majority of labs (12 of 17) had 14 or less full time staff on their team. The distribution of staff size is seen below:

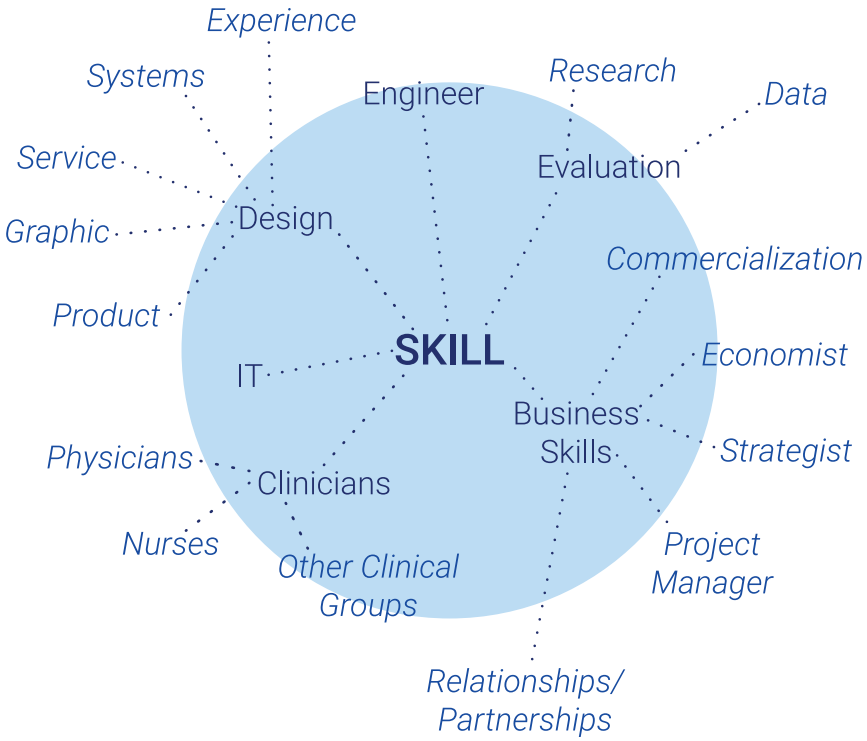
Size and Skill Mix

0 - 5	6 - 14	15 - 24	25+
5	*7*	*2*	*3*

Labs did point out that their work was complimented by the use of volunteers and

students particularly in those labs at hospitals with academic affiliations. Additionally, some labs also contracted out services to designers as needed on a project basis to augment the people working in the lab. It was also noted that labs with larger staff sizes tended to have broader innovation agendas beyond design with many staff support the scaling and sustainment of innovations along with commercialization activity.

Skill Mix

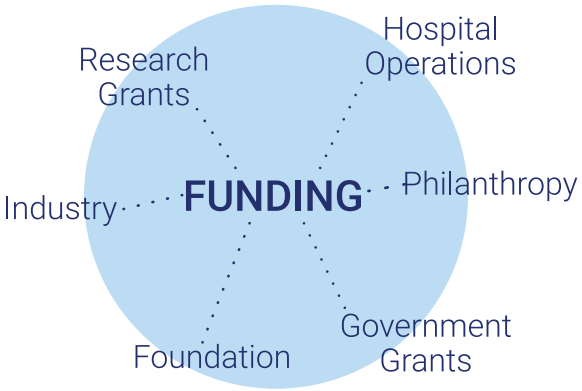


In terms of skills responses were varied with a larger mix in labs that had a broader focus on innovation. In terms of design skills, the largest group identified were those that focused on service design as a core competency. This was followed by experience designers and graphic designers as the core focus of design work. Complimenting designers in these labs, professionals mentioned included physicians or other clinicians, engineers, strategists, economists, researchers, project managers,

IT staff, data specialists, business managers and commercialization experts. Depending on the core needs of the lab and their strategic focus a broad range of talents and professions were mentioned.

Interestingly, patients and family members were not mentioned as core members of the teams. In follow up questions, patients were frequently engaged on a project basis with labs. They were studied as part of ethnography in clinics or hospital spaces and were engaged either directly by the lab to be team members or through central patient engagement structures in organizations.

Funding

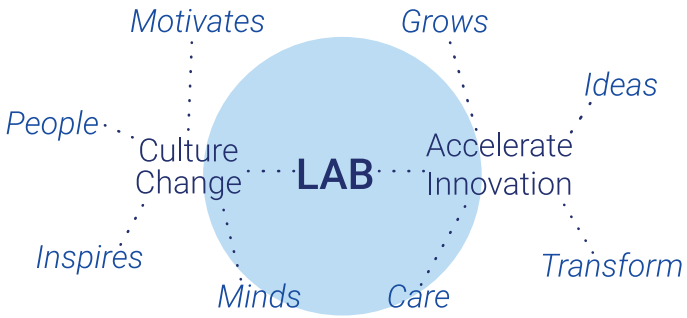


Over half of the labs interviewed mentioned that they were wholly or partially funded out of core operating dollars of their host organizations. Other sources of revenue to sustain the labs included research grants, philanthropy, government grants and industry dollars, often attached to specific projects instead of just core funding. Almost all labs mentioned that they had some combination of funding from a variety of these sources but it was noted in interviews that operational funding allowed for better predictability in sustaining lab operations particularly as it applied to project delivery crossing fiscal years and in attracting and retaining talent.

Space

An interesting finding in this work was that the lab was not always confined to a physical space or location. While most labs indicated that they did have a physical space where people could come to create and innovate, a couple of labs indicated that they were virtual and that their lab was intended to go to wherever the problems were to innovate with people in that space. Many interviewees also indicated that they were a blend of a physical and virtual lab with the ability to move around the organization as needed depending on the projects that they were working on.

Rationale for Use



There was some consistency across labs on the rationale behind their formation. The two main areas of focus when analyzing responses in this category included the lab as an enabler of culture change and the lab as an enabler for innovation. Most labs referenced a mission statement or manifesto when describing their rationale. These manifestos indicate or reflect on a strategic process to define their intent. Examples of Manifestos or Mission Statements include:

"Accelerating ideas to transform healthcare."

"Accelerate the transformation of the system."

"Redesign, rethink, re-imagine, we design better healthcare experiences with patients, their families and staff."

"Harvesting human centered design to improve healthcare outcomes and

catalyze change."

"We exist to do nothing less than fully transform healthcare by making it more simple, human and engaging so that we may each access life's potential through optimal health."

Interviewees spoke to the importance of the lab to change the mindset of the organization and those that work within it. Words used in this regard included *"inspire"* and *"imagine"* with a focus on enabling people to believe that they could contribute to positive change. This was also consistent with findings related to metrics for success where some labs were trying to measure culture to indicate impact of the lab's work. One interviewee spoke about changing the way people think, describing it as:

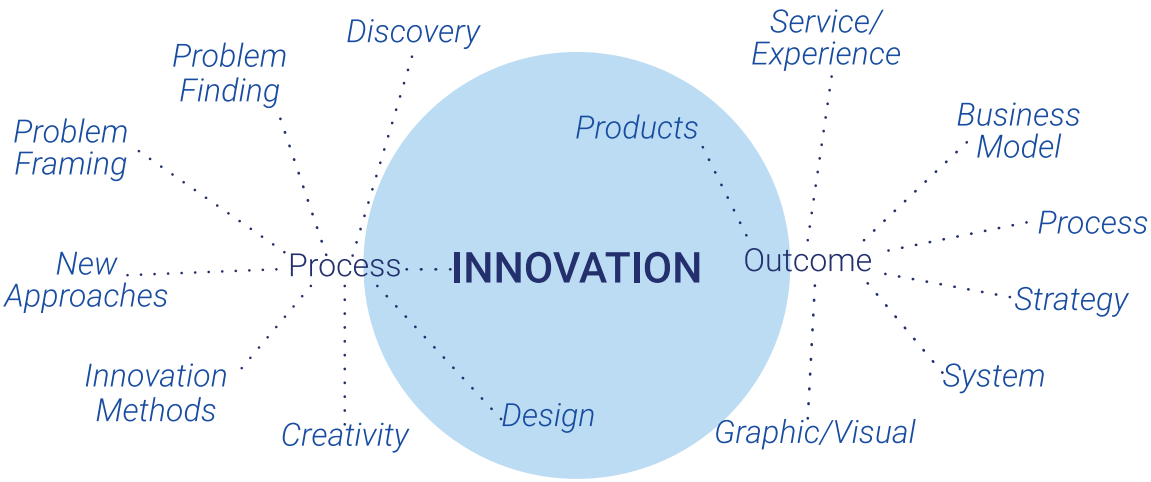
"Design brings form to ideas and helps people have conversations around what matters to them. Giving form brings ideas to life, helps people to make sense of their thoughts around something. Such as, what does the future of health look like fifteen years out? Bringing form to an idea helps people think differently about what matters".

The second theme was how the lab would innovate. Examples of how this was described included words or phrases like "accelerating innovation", to "grow" ideas, to act as a "catalyst" for change. Other verbs used included "lead," "transform," and "re-imagine." These were used across interviews in responses that reflected a desire to build a space in which people could create and build new solutions to problems they faced. Interviewees mentioned that they sought to impact outcomes, cost, experiences, health status and culture.

Lastly, many also spoke to a better future or a different reality than the one in which they were operating in today. Whether they referenced a product, solution, process, service, experience or system, the consistent response was that movement

towards a better future was being enabled through the use of design.

Innovation Focus



It was important to study the rationale, or strategic intent, for these labs in order to determine what impact they were achieving. Their intent includes how they defined innovation and the types of innovation that they were focused on.

Innovation Definition

This particular question elicited the most interesting reactions from interviewees. In general, most laughed which was an interesting response to the question. A small number also mentioned that innovation had become a buzzword or something that they do not really reflect upon. Many also categorized innovation in two parts, process and outcome.

1) Innovation as a Process

Participants noted that their interpretation of innovation was that it was a process and that design was the enabler of the process or the process itself. They have been able to identify problems from a human centered perspective and then design solutions/processes/services/experiences to address those problems. One interview-

ee commented that "some people's gut reaction is that innovation is a shiny thing, but the reality is that it is a process." A few people also pointed out that innovation is really about creativity. It is a creative problem solving process that brings new ideas or approaches to existing problems. Another stated:

"Innovation is a process o proactively identiying new opportunities and finding new approaches to existing problems. It is about combining and arranging insights and creating new ideas, methods and ways o doing things."

A second insight revolved around teaching the innovation process. One lab referenced clinical learners and spoke about training them in design since nowhere in their current curriculum are learners taught "how to innovate." As a process, innovation is a teachable skill and the focus of some of their work is in inspiring and teaching the next generation of clinicians in how to innovate through the use of design.

2) Innovation as an Outcome

Some also described innovation as an outcome. It is a product/service/experience that is new and better than what is currently being offered. One group phrased this as *"something new or radically improved."* The output of the design process is enduring and it is in the implementation of an idea that innovation lies. Another group phrased this as *"Innovation is not ideation. True innovation is at the implementation phase. Scalable and sustainable to fully realize an idea to where it is being used."*

For those that answered that innovation was an outcome, the response was often framed around the impact of the service/experience/product that was created in that it captures tangible value, is enduring and reaches a broad audience because it has been adopted to a meaningful extent (i.e. at scale). One group described it as

"Innovation is an outcome that's better than what exists. It has widespread appeal because it makes life easier. It solves a problem, a pressing need."

Keywords Used in Describing Innovation

This question yielded a number of responses that had similar key words used in the description. An innovation must be "new" offering greater "value" than what current-ly exists. It must be "implemented" and "scaled" and does not simply sit as an "idea." It addresses a "problem" that exists and it "improves" pain points that exist. Clusters of text existed around these key words indicating consistency in people's understanding of innovation as a construct.

Focus of Innovation Agenda

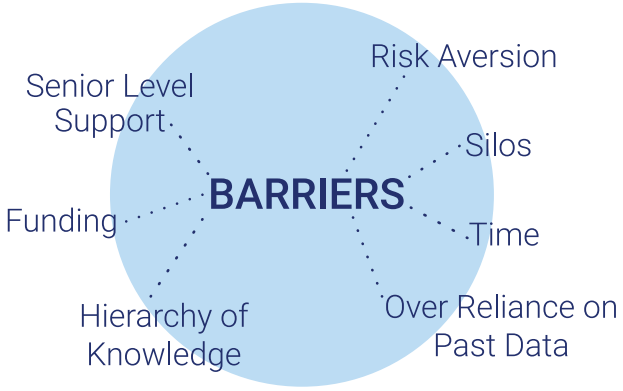
Interviews were designed to better understand the outputs being achieved at each of the hospital design labs. The question on innovation attempted to better understand the types of innovations being developed and the areas in which they have been able to implement ideas or make changes. Labs were asked to choose amongst service innovation, business model innovation, process innovation, product innovation or system innovation to describe their outputs.

The responses to this question had a large degree of variability in terms of where their lab efforts focused. Many answers indicated that there was no one specific focus but that it shifted depending on the work they were involved in or problem they were solving. Most labs reported that they had a focus on service/ experience innovation and/or either product or process innovation. It was interesting to see the overlap in responses between service and product innovation particularly as it relates to new IT solutions and their role in improving care. Seven labs shared that they either had a focus on systems innovation or that they would like this to be an

area of focus in the future. For those that said they were focusing on business model innovation, all were located in the United States.

Answers to how labs self-identified in this regard included *"I would consider us a service design shop. A lot of the work that we do, especially over the past year, has been focused on the patient experience."* Another said that they *"view our mission as transforming the way that people experience health. Which tells you immediately that we are more of an experienced oriented lab."* Another said "*Business model innovation is huge focus for us actually and moving past just technology to redefining how we deliver care."* A final lab said that *"They do all of these to some degree with no particular focus but system level change is where we would like to be delivering value and we are slowly trying to get there."*

Barriers to Innovation and Design in Healthcare



An important element in better understanding the function and impact of design labs, was understanding the barriers to innovation that they have encountered. Responses to this question were broad but themes included:

1) Time – Answers relating to people's time were mostly concerning clinician time. It was acknowledged that they are busy people making it hard to find time to

participate in design workshops. Pulling clinicians away care, meant that they either had to either ask clinicians to find time or an alternative method of paying for their time had to be found. A second area identified was the length of time it takes to make change happen in healthcare. Healthcare functions at a different pace. Design sprints were often difficult and frustrated some designers involved in this work.

2) Difficulty Spreading and Scaling Innovation - It was also pointed out that healthcare is famous for an over reliance on pilots with one group describing the phenomenon as “pilotitis.” The ability to continuously test ideas without scaling and implementing solutions seemed endemic in their environment.

3) Funding - Another area that came out in many interviews was how the lab would pay for people, space and processes. Some labs found difficulty in getting internal funding from their host institutions. They shared that design was not viewed as mission critical even though they had been able to find local success. In more established labs and in labs where they had secured stable operational funding, this feeling was not shared. Across many interviews, it was felt that healthcare is dominated by cost cutting and finding efficiencies sometimes at the cost of investing in design and innovation. In some cases, the focus on costs seemed to be driving the innovation agenda as solutions focused on how to generate savings or new revenue for the organization.

4) Hierarchy of Knowledge - Healthcare has a long established history of using re-search to develop evidence to inform decisions about practice or policy. This

typically involves randomized control trials as the highest standard of evidence. For very good reason, it ensures that treatments have been fully tested for efficacy prior to spreading their use. Some interviewees shared that reliance on this type of evidence hinders the use of design in academic centers, as the level of evidence generated through design research is not held in the same regard. Some labs are therefore engaged to help "implement a solution" versus using design research to unearth problems that need to be solved. It was an underlying tension that multiple labs shared. One described this as: *"We often say that the problem as stated is quite different than the problem understood. After we spend time using observational methods of human centered design we relatively quickly come to a very different problem. This is difficult for many doctors, scientists and re-searchers to understand."*

5) Risk Aversion and Senior Level Support - Closely linked to the use of randomized control trials as the most acceptable source of evidence is risk aversion. Many interviewees shared that they felt stifled by a sense that they needed permission to try something new. This meant that the concept of testing a prototype (which is normal for designers) was not natural for people in healthcare. Interviewees also pointed to the permission-based culture that dominates hospitals today. Senior level support at administrative and clinical levels is often needed to provide "permission" to innovate. Healthcare functions in a rules based environment for good reasons but this also impacts the ability to innovate outside of those rules.

6) Over Reliance on Data – Although it may seem counter intuitive, it was revealed in multiple interviews that healthcare's reliance on data may perpetuate its risk aversion. The reason cited was that data is hindsight focused. It involves looking at things that have happened in your current system and projecting that performance into the

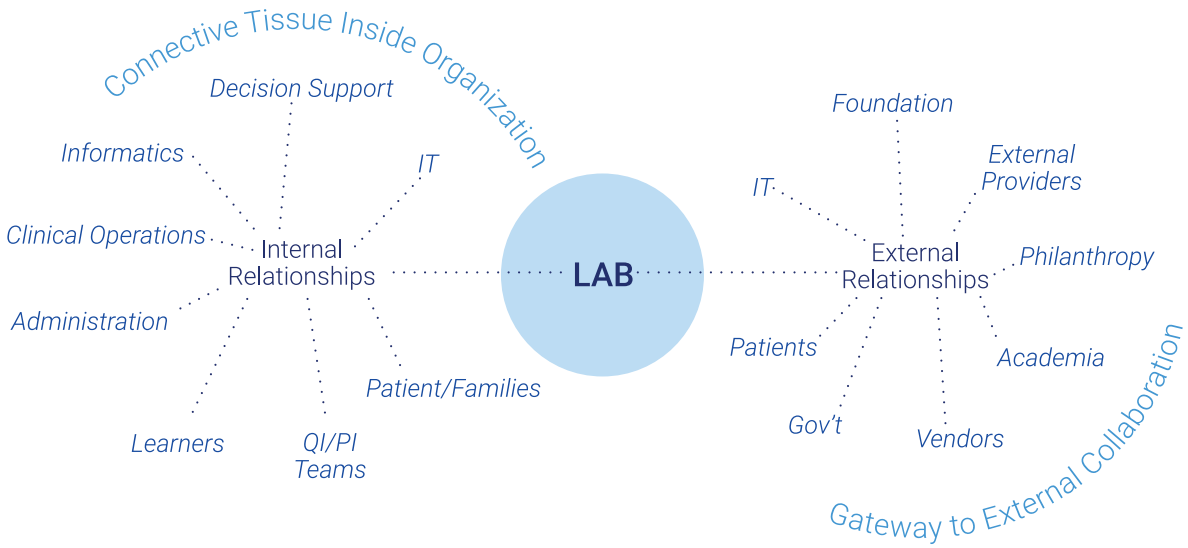
future. It is based on a system that is already in place. Design seeks to create something new, where no data may exist; and data is emergent. In an environment where people are rewarded on performance related to existing data, it becomes difficult to create something new without embedding uncertainty into the design process. One participant mentioned that - *"If you have never seen evidence that something worked, you need to suspend your beliefs to believe that something new might actually work."*

7) Systems Based Innovation and Siloes - The healthcare organizations interviewed are all in hospitals that are part of larger health ecosystems. Only seven of the seventeen hospitals mentioned broader health and social system level foci to their work. This may be a function of their place in the system. Multiple interviewees however mentioned that they felt a barrier to change was the siloed nature of healthcare itself. Within hospitals, they encountered departments, programs and clinical groups all working in an independent manner with very little connection. The design lab itself became a connector for these groups but it was felt that this was not enough to overcome this fundamental barrier to change.

2. Place

The lab's "sense of place" describes who the lab partners with internally and externally and how they work with them. Additionally, it focuses on how the lab enables the change agenda of the hospital framed in the concepts of quality improvement and innovation, both of which are unpacked based on the insights of interviewees. Lastly, this section will detail advice given by those interviewed on how best to approach partnerships and working with innovation and quality improvement teams. The accompanying synthesis map visualizes these relationships that exist in the lab.

Internal and External Relationships



Internal Relationships

1) Information Technology - Many labs cited a close partnership with the IT department in their hospital. This reflected the focus of some labs in supporting digital health through the development of IT products and solutions and the services and experiences they enabled. While most cited close relationships with IT, many also indicated that IT resources were stretched which sometimes meant projects could be delayed or even put on hold based upon this constraint.

2) Data - A second internal group that labs partnered or worked closely with were the holders of the hospital's data repositories. This included informatics teams, decision support, analytics and privacy teams as the custodians of data and information needed when building some of the solutions the labs developed. They also partnered with these groups when it came to evaluation of the solutions being developed.

3) Clinical Teams - Working in hospitals, the focus of design labs' work was often related to internal clinical activities. Although some indicated that they were doing

external work on a consulting basis as a revenue stream, the majority had a large focus on internal activity. This involved working closely with clinical teams in different departments of the hospital. Many mentioned strict criteria for accepting projects including a shared understanding of what the design process is and outcomes that must be achieved.

4) Clinical Learners - A few labs mentioned partnerships with the teaching and education arms of the organization. This was particularly true as it applied to teaching learners skills related to design or in trying to achieve a critical mass of people in the organization who were fluent in design.

5) Process Improvement and Quality Teams - Design labs had a large degree of interaction with quality and process improvement teams in most organizations. As improvement and innovation are both change processes, design labs had to understand the work of the quality team so that they could meaningfully co-exist.

6) Patients and Families – An obvious internal relationship was also the labs' engagement with patients and families. Many mentioned the ability to walk out into clinical environments every day and ask questions or observe patients/families as a critical enabler for their work. All also mentioned that they had formal processes to engage patients and families in their organizations should the need arise.

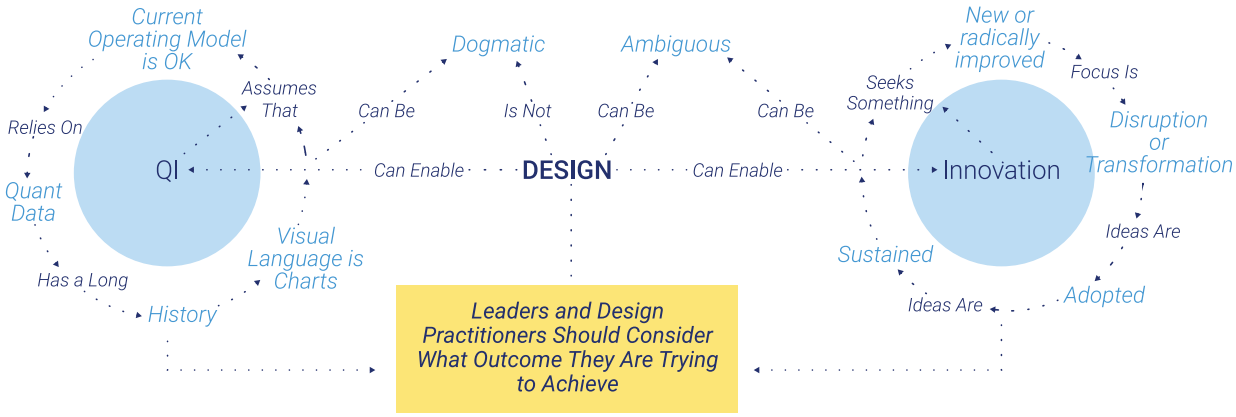
External Relationships

Building on the relationships that were developed inside the hospital, some labs also had an external focus to their work. External relationships were shared from one of two perspectives. The first was project-based in that design initiatives involved partnering with external groups on an initiative, contracted design services or large initiatives that involved multiple stakeholders. The second set of external relationships were related to more formal partnerships that have been created with funders, sponsors, industry or other healthcare providers to consistently support the lab's body

of work or projects. External stakeholders included regional or national tech innovation intermediaries, government agencies/partners, academic institutions, industry and tech firms, researchers and other healthcare providers who may be public or private.

Quality Improvement and Innovation Agendas

The previous section sought to understand internal and external relationships when analyzing the labs' sense of place. The following section will analyze how the lab framed its relationship with the overall change agenda in the hospital. This involved better understanding the relationship between quality improvement and innovation and how the design lab relates to both pillars of activity.



What is Quality Improvement?

Interviewees were asked how they defined innovation and how they described the differences between quality improvement and innovation. Design can support both approaches and interviewees repeatedly pointed this out. They also pointed out that quality improvement is a form of innovation largely predicated around process innovation. The critical pieces for design labs to consider were how they interacted with the organization's quality improvement team, how they defined the differences in approaches to innovation and QI and what tools they were going to use when approaching both. Quite often the critical difference between the two was the mindset

of the team and the ambition of the project they were involved in. The dialogue related to a quality improvement definition fell into the following four theme areas:

a. Focus on Current Operating Model - QI has a focus on the current operating model and processes. Its bias is that things are generally working well and that the system needs to be augmented in order to eliminate waste, reduce inefficiencies or to improve performance. This was described by one interviewee as:
"Quality improvement assumes that the current model is adequate and it can be tweaked to become more efficient The existing approach is correct and we can reduce waste or improve efficiency or performance in that model. There is a very significant reason that QI should exist because healthcare is in many cases extremely inefficient or very bad at executing within the current model. We know improvement should be pursued and pursued often. So for a very long time quality improvement was the primary mode of change in healthcare. It is appropriate to have QI but it makes a fundamental assumption, that the current operating model is correct."

b. Reliance on Quantitative Data - Inherent in the QI process is a focus on measuring change based upon historical performance. Central to improving performance on historical data is that the approach will naturally lead away from transformational change as you will not be looking for new processes where no data currently exists. The ability to develop and test a new model is not included in this process. QI by its nature seeking convergence and stability, reducing variation and attempting to incrementally improve performance in an iterative fashion. It does not seek to disrupt what is functionally assumed to be working well. This was described as:
"Quality improvement is important for systems to help eliminate errors. Its effective in helping reduce costs but it is not as effective in identifying what people really need. The reason is that it focuses on quantitative data. People will tell you what they

really need but often it is more qualitative in nature which is more of a design focus than traditional QI. Learning what is meaningful to people allows you to create entirely new services and experiences. If you look at the measurement that goes into six Sigma or what goes into LEAN tools it is very quantitative not qualitative. This will not allow you to create entirely new experiences or services."

c. Well established - Many commented that QI has a history in healthcare organizations. There have been large investments in teaching methods and tools and teams have been built to support improvement at a corporate level. It has also become something of an expectation of most clinical teams to improve quality and it has moved from a corporate imperative to something that front line clinical teams have an understanding of. This understanding has been good for healthcare in that continuous improvement of operations and performance is desired and it has been positive. Where some felt there was a need for focus is moving away from QI being the sole approach an organization looks to when it comes to change.

d. Visual Language is Data - QI also has a visual language that does not draw people in at an emotional level. It focuses on data and the visual language has been run charts, control charts and other data based charts. While graphic design has complimented this recently through compelling infographics and other visual representations of data, the QI approach has traditionally felt mechanical and engineering based. One person commented that: *"I find that QI lacks a visual language which for me is absolutely important in terms of framing a different way of understanding or making sense of the kinds of the problem we are trying to solve."*

What is Innovation?

Each interview included a question on how innovation was defined and a

second question on how it compared to quality improvement. The second question elicited more feedback as people reflected on the differences and similarities between the two constructs. It also revealed an inherent tension in the language of change in hospitals as some felt that the two were being used interchangeably with underlying approaches not matching the intent. Definitions of innovation fell into the following themes:

1) New or Radically Improved – Descriptions of innovation involved the implementation of new ideas where there was no existing knowledge. While best practices and standards rely upon past knowledge, innovation is the creation of something new, something different than what exists today and something designed that does not resemble what already is in place. This was described by one interviewee as: *"If you are using a quality approach, you are leaning on best practices or knowledge that is already there about how best to do something. But when you're looking at areas where there is no pre-existing knowledge of best because we've never done it this way before and we're building the knowledge as we speak, then that's innovation. So it requires design because design allows you to take ambiguity and create something from nothing."*

2) Transformation - Another focus of many of the definitions was that innovation focused on transformation. The outcome in innovation is different than quality improvement in fundamental ways. The outcome demands a different mindset and tools to achieve success which is where many felt design played a role. One response that reflected this was, *"Innovation involves a transformative state that changes the entire frame of your work. The thing that is created is radically different from what's available today and this is often quite difficult to do."*

3) Adopted and Sustained – It was mentioned multiple times that for an idea to become an innovation it must be "adopted," "scaled" and/or "sustained." Without adoption, ideas are just that and interviewees were consistent in sharing that design enables the full process from ideation through to wide-scale adoption of an idea. That is, it's not only about the creative process in generating new ideas to intractable problems, but also following through on getting those solutions adopted at scale. One interviewee described this as: *"Innovation is not ideation. True innovation is determined at the implementation phase. An innovation must have been scalable and sustainable to fully realize an idea to where it is being used widely."*

Understanding the Differences Between QI and Innovation

There were some key themes that emerged to describe the differences between these two approaches. In describing the differences, it must be noted that this dialogue tended to be non-judgmental with most feeling that QI and innovation were complimentary approaches to change. The differences lay in the type of change that the lab might be focused on, and how design could be used for either. Additionally, those working in both spaces in health care organizations need to have a good understanding of the other in order to be successful. The following themes emerged from the interviews:

1) Investments Made in Healthcare QI and Innovation - Many pointed out that for a long time QI has been the dominant approach to change in healthcare. Over the years, significant resources have been invested in teaching people how to do QI and what tools they may use. Nearly every hospital now has a VP or Chief of Quality, few have the same dedicated executive lead on innovation. It is a core capability in organizations whereas design is not, and innovation is something that although talked about, is rarely defined in a manner that people can grasp, leading to the notion that it simply a buzzword in healthcare. Further, many staff in hospitals equate innovation with technology,

especially commercialization, not with the terms or framework described above by design lab leads.

2) The Desired Outcome - The outcome being sought through innovation seemed to be the key point of difference that most raised when asked to compare it with QI. The tension between incrementalism (Improvement) and transformational change (Innovation) seemed to be a focus point for people's distinction between the two approaches. Many pointed out that incremental change could be engineered and planned like a project with definable metrics and timelines. The assumption in QI is that the underlying operating model is sufficient to achieve improved outcomes and structured (and predictable) process improvement is all that is required to achieve results. Innovation, on the other hand, is emergent. It is fraught with failure and constantly iterates in new directions as the design process narrows the gap from identified problems to adopted solutions. One interviewee described this as *"It is the job of QI to stabilize everything, it is the job of innovation to disrupt the status quo."*

3) Ambiguity – Interviewees shared impressions that QI is dogmatic in its approach whereas innovation has an element of wide divergence in reimagining possibilities and solutions. It is intentionally messy in trying to push mindsets to fundamentally rethink the system. This puts it at odds with reducing variation through QI. Feedback was consistent that the scope of the outcome is the defining difference between these two approaches to change. One person framed this as *"Design allows you to create something from nothing. It's allowing you to challenge existing assumptions to break your pattern of thinking and come up with an innovation that is totally different than what you have today. This is a very ambiguous process unlike traditional methods of QI."*

Enhancing Relationships in the Hospital

Most labs were clear that the focus of their work was innovation. There was advice offered for designers as they work with QI teams in the hospital. This advice included the following:

1) Establish Relationships - Many spoke about positive relationships with QI teams with some referencing tension as the teams got to know each other's work, approaches and focus. Positive relationships did not happen organically and were curated as leaders intentionally engaged QI teams. Some also referenced that they had their designers take courses in Lean so they could understand the language of QI.

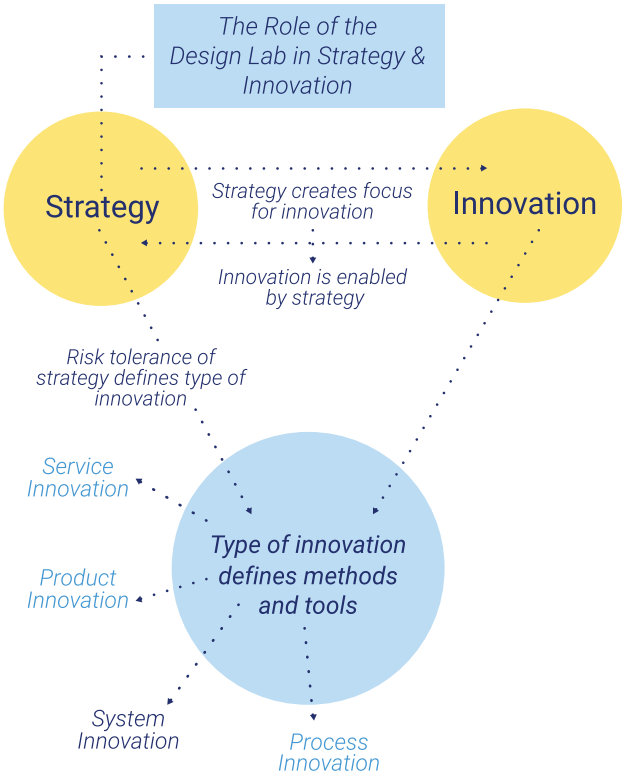
2) Establish Scope – It was noted that the design team should have a clear mission so that they understand what type of work they will do. While both innovation and improvement are approaches to change, conflict may arise when the organization does not understand the lab's mandate. Impressions that the design team were dreamers and that the QI people were doers was shared in some organizations. This was overcome with continued engagement with different groups as people learned the value of the work.

3) Don't Compete – A few labs mentioned that its a good idea to form healthy relationships with the QI team as both sides can help each other in their change mandates. While outcomes and scope of work may differ, both exist to make the organization better which is common ground. Additionally, it was mentioned that there are parts of the QI process where design is a good tool to help in ideation, experimentation and innovation. QI can also be effective in implementation and scaling of new ideas.

3. Impact

Insights from interviews revealed how labs were seeking to make an impact and what was influencing their ability to do so. This section will review Strategy and Intent, Metrics and the lab's Ambition and Maturity. Together, these areas allow for a better understanding of how labs are achieving success.

Strategy and Intent



Insights from this work demonstrates that the link between strategy and innovation influences how the design lab is positioned to support the innovation agenda. An organization's innovation agenda is built from the strategy of the

organization. The Board and CEO set the innovation ambition of the organization and then mobilize resources to innovate. In most clinical settings, clinicians already innovate daily. Most do it because they have an amazing ability to improvise on the front lines to take care of the patients they see every day. Others innovate based upon research they are doing or clinical quality improvement.

The CEO and Board though, are seeking to build a longer term strategy that influences change at either the organizational or system level. Their ambition will dictate how innovative this process will be and how the lab may play a role in influencing this work. What became clear in this research is that many of the labs interviewed are doing a lot of work in innovation at the clinical and operational level or in day to day operations in the hospital. Many also share a desire to move outside of this space into greater influence at the organizational and system level. Many labs shared that they did not have the ability to influence decisions on which levels of the organization they could innovate in. Reporting structures and strategy seemed to have the greatest influence on them.

The lab's strategy did not always appear to be created in isolation from the hospital or parts of the hospital. The lab often had to consider their place within the organization and the direction from the leaders responsible for creating the lab. Labs shared that they reported to different leaders and leadership groups in the organization and nuances to their work were apparent in each. Reporting structure and organizational or clinical strategy seemed to be the two core influences of a lab's strategic intent.

Reporting Structures

Reporting structures included the following:

1) Quality - Labs that indicated they reported up through the Quality department in mentioned they were accountable to a VP, Quality, Chief Quality Officer or equivalent in the organization. This enabled a holistic view of the two core change processes in the organization, Quality and Innovation. These labs appeared to have a focus on clinical innovation, experience design and some business model innovation. One also had a focus on systems design as part of its work.

2) Strategy and Innovation - A second group mentioned was Strategy and Innovation. These labs seemed to have a closer link to the core direction of the CEO and Board. They seemed to have a greater ability to be influenced by or to influence the direction of the CEO. These labs seemed to have more of a focus on business model innovation and systems change.

3) Medical Leadership - A third group mentioned was medical leadership. This included the Chief Medical Officer, Chief of a department or other equivalent medical leader. These labs tended to have greater freedom from the organization and some had more of a focus on medical leadership, medical trainees or clinical innovation.

4) Research – A few labs mentioned that they had a link to research funding or grants as their genesis. These labs either started with a specific focus or evolved based upon the mandate of their grants. These labs did indicate that they may have a greater free-

dom from hospital operations but there also seemed to be some concern regarding stable funding and how they might ensure continuity.

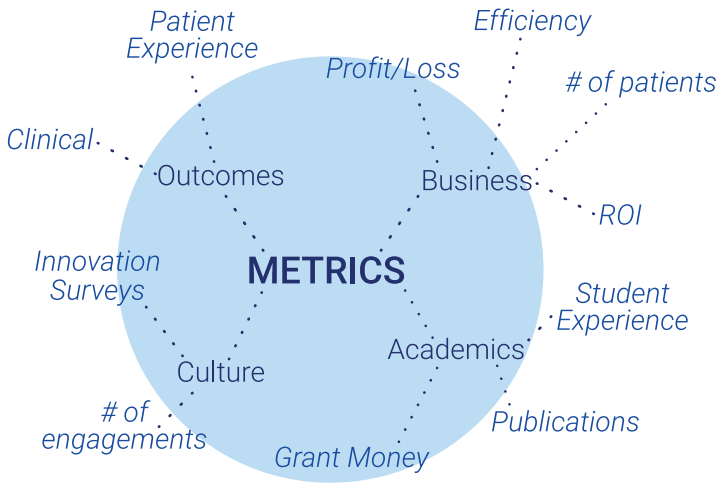
5) Patient Experience – One lab mentioned their genesis came from a partnership with the patient experience team with an academic focus to its work. This model seemed to be more independent from the organization in its design projects.

Organizational or Clinical Strategy

Design labs shared the extent to how their work was influenced by the organization or the person they reported to. True independence from any entity was not found in this work. The closest to fully independent labs in a hospital seemed to be those that either existed because of research grants or those that existed through medical leadership. Both of these groups though seemed to have concerns around sustainability in that they needed to generate revenue for lab activity. The groups that paid for services then had some influence over the lab's direction even if it was latent.

Labs that were funded from operating dollars indicated that they had responsibility to deliver results on the organization's strategy. This included a focus on experience as a core metric of organizational quality or on a lab's focus in improving hospital operations. Some labs indicated that they were also involved in IT design, user experience design and product design. These labs had a focus on improving current offerings, developing new products to improve current operations or on commercialization. Lastly, some labs indicated that they had a focus on business model innovation and systems transformation. These tended to be associated with strategy or innovation in the organization and were more closely linked to the CEO. These labs were the exception. Regardless of placement within the organization, the ambition of leadership and the strategy of the organization seemed to influence the lab's direction of work. This is discussed below in the "Ambition and Maturity" section.

Metrics of Success



One of the goals of this research has been to identify signals that might measure the effectiveness of the design lab in the hospital context. Interviewees were able to cite a number of successes on projects that they worked on or products that have been developed and scaled. Additionally, longevity and increased funding over time was also cited in measuring success. From a metrics perspective, four distinct areas were identified as spaces where data was being captured to measure success.

1) Business Outcomes – These metrics focused on a return on investment for the lab. Metrics cited here included those based on commercialization of products or tools developed in the labs. The number of patents developed was also used as a measure with regards to products and solutions built. Additionally, many of the labs mentioned that part of their revenue model was related to industry contracts for project work and the profit margin related to this work was important to maintain. Efficiency metrics were also mentioned by a couple of lab where process innovation was mentioned as a focus for work.

2) Clinical and Experience Based Outcomes – Many labs had a focus on improving clinical and experience based outcomes. Measureable improvements over the status quo were cited in successful clinical interventions designed by labs in this study. Interestingly, there is a paucity of published information as it relates to the impact of design on outcomes. When this was considered as part of a follow up question, it was mentioned that design research methods are not fully accepted within mainstream academic research in healthcare.

3) Cultural Metrics – Given that many mentioned the rationale for the lab was associated with shifting culture and mindsets, some labs examined whether or not they could measure an impact in this regard. This was said to be more difficult to measure and proxy measures were mentioned including the number of staff or physicians involved in design initiatives or lab based projects.

4) Research, Academics and Scholarship – Some labs had affiliations with design programs at universities. This meant that some research, academic and scholarship based metrics were cited. These included the number of papers or presentations, quantity and quality of learning opportunities for students and the number of grants received for design engagements.

Outcomes of Design Lab Activity

It is difficult to assess whether or not design labs have been an effective model for innovation in hospitals. This may be too specific to measure in a study of this nature. What is measurable, is that organizations shared multiple projects where they have been successful in developing new tools, processes, products, business models and services that had a meaningful impact on experiences and outcomes. Additionally, multiple labs have received more funding to expand operations indicating that the work they do is valued by the organization. As these labs appear to still be relatively new in their evolution, it would be difficult to make a determination of effectiveness but there is self-reported positive impact at many of the labs interviewed.

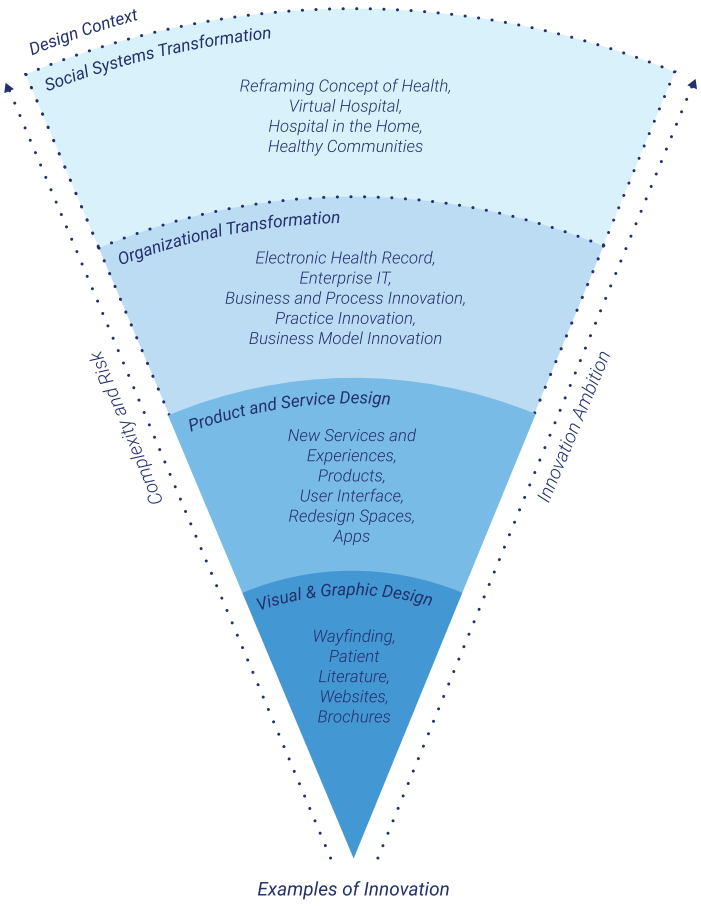
Ambition and Maturity

An interesting tension emerged around the innovation ambition of the lab and the organization it was based in. Designers mentioned that they would like to focus on systems based change and initiatives like reframing the concept of health, building healthy communities and ambitious hospital projects like designing hospitals with no waiting rooms. The organization often would ask designers to help build better visuals or to work on projects like way finding that were in some ways low risk but could make the environment and experience better for patients and staff. This mismatch in ambitions quite often led to tension amongst designers and the organization itself. Further, leaders from labs that had been around longer mentioned periods where they questioned their existence seeking to understand whether the organization could match the lab's ability to think more broadly than just graphic design. In some ways ambition and the maturity of the lab's design focus were often mismatched. One interviewee stated:

"Design will be more relevant in the future for health care because we can't just look at the work of a hospital and not look at the main goal of the patient or citizen which is not to come to the hospital at all. We need to think about healthy and happy people rather than just curing unhealthy and unhappy people."

To visualize this tension, a model called the Ambition and Maturity Model was created. It is based upon the Design Domain work of Van Patter and Jones (Jones, 2013) and on Richard Buchanan's Four Orders of Design. (1992) An arrow was placed on the left side of the model to indicate that complexity and risk increase as you move higher into social and systemic transformation. This is a reflection of the complexity

and risk of the innovation process itself. The right side of the model also has an arrow moving upwards which depicts the ambition of the design lab to do work across all levels but particularly towards systemic design and transformation. As a lab matures, those working in the lab seek to move higher up the domains of design towards systems design. This is a reflection of their ability to design across domains. They are skilled designers at sometimes mature labs who they have the ability to do all forms of design. The mismatch between the lab's ambition and the actual work being done is what is termed the ambition/complexity dilemma.



The Ambition/Complexity Dilemma

In the context of this research, participants indicated that hospitals value design in the spaces of graphic design, product design and service design. Systems design has been harder to do. But for patients and families, systems design is actually the area of innovation where there is potentially the greatest impact. It is also the area of highest complexity making it much harder to do, much harder to achieve success in and it presents greater risk to the organization. The only way that you can move into systems design is if the ambition of the organization and lab will allow designers to work with stakeholders on innovating in this space.

This tension is depicted in the model by the arrow along the left side that refers to complexity and risk. It is inherently more difficult to move towards organizational transformation and social/systemic transformation due to the added complexity of the work. While a designer can enable activity across all four layers of this model, the complexity of design engagements will make this work more difficult. That is, the domains the designer will be working in are increasingly complex even though the designer would like to work there.

One lab shared this tension by saying:

"I'm not sure that the organization understands what design is. What we are asked to do is very much about fixing hospital problems. We're interested in reframing and designing health and wellbeing broadly. Why can't we do more work outside the hospital? I don't know how much of that is what we do or lack of clarity from the organization."

The impression that the design lab could do more was shared by many research participants. Interestingly, this insight was more apparent in labs that had been around longer than 3-5 years and seemed to be indicative of a plateau in ambition as

the organization limits the scope of the lab's work. Some shared that when they were new, they took on more graphic design and visual design work in an effort to demonstrate their value. As they matured it appeared as though a plateau was reached unless the lab was enabled by systemic and organizational design. Maturity and ambition seemed to be linked as did maturity and lack of ambition. The mismatch between the ambition of the lab and the ambition of the work they are being asked to do is the zone of discontent. It is the delta between these two places that seems to have been the most frustrating for those working in the labs interviewed. The ambition/complexity dilemma is an insight worthy of further exploration by design and innovation leaders in relation to their own practices and how their labs are structured.

How Might We Use This Model?

This model is intended to provoke dialogue on the intent behind a hospital's design agenda. It depicts a gradual expansion in the placement of design work from graphic design to systems design with each domain adding complexity and risk. The model can act as a tool for enhancing dialogue on the use of design while measuring the maturity and ambition of the organization's design efforts. It is hoped that it may provoke thinking on the strategic intent and direction of innovation efforts in the lab and hospital. It may also challenge existing orthodoxies around the limits to design in the organization.

4. Future

The last part of the interview asked leaders of the labs three distinct questions about where they felt the future was headed as it relates to the use of design in healthcare and for the future of their labs. Additionally, advice was sought for others seeking to enter the space of design in healthcare. Responses were as follows:

Future of Design in Healthcare

Responses related to the future of design in healthcare must be taken with an understanding that everyone interviewed were either designers or the leads of design labs. Within this context, responses revealed what these individuals saw as the value of design to their organizations and healthcare. The following areas were covered in the responses.

a. Valuing the Experience - As health care systems embrace the value of the user experience (patients, families, staff) as a key component of healthcare quality, they will be looking for new ways improve it. Interviewees pointed out that they saw a niche for design as the prime tool for enabling a better experience. Design can enable healthcare organizations to co-design systems, processes, and products with patients since understanding the user is at the core of its methods. The concept of a life lab in organizations to enable this work was brought forward from one interviewee. Design may allow organizations to become truly patient centered giving users an opportunity to co-design the services it provides. This is particularly important as the environment is further influenced by peer to peer conversations and word of mouth. One person shared that, *"We have a lot of resources dedicated to the advancement of medical science, but maybe the art of caring is thinking about the human experience of care and that's where we truly can make an impact using design."*

b. Shifting Mindsets and Challenging Orthodoxies - It was also shared that design may be able to play a role in shifting the culture of organizations. Design brings form to an idea provoking conversations that would not naturally occur. These conversations

and dialogue can challenge existing orthodoxies and beliefs allowing the organization to imagine new possibilities in how they create services, products and processes. Additionally, it can challenge the very philosophy of the healthcare model - that is the sick care model. Design may enable us to shift our beliefs from a system predicated on the concept of sickness and chronic disease to one that is framed around health. One lab described this as: *"we have to come to the understanding that we need to stop thinking about health care and start thinking about health. We have to stop thinking about chronic disease and start thinking about chronic health."*

c. Rigor in Methods - One of the challenges previously mentioned in this work was that design is not accepted as a discipline in the scientific approach of most academ-ic and hospital environments. A few mentioned that in order to overcome this, and to advance the "science of design," it's incumbent upon designers in the healthcare space to be rigorous in applying design methods and tools and focus on the concept that this is valid, academically defensible research underpinned with structured methodol-ogies. This shift will also enable a move away from design as a one-off experimental tool towards using design to achieve outcomes and implement solutions. There was a feeling shared by some that design was sometimes being used as "innovation theatre" rather than as a tool for enabling sustainable high-impact change, although this was not universal.

d. Systems and Foresight Focus - While labs seemed to share the ability to develop new products, processes or tools, or at the very least, to enable new dialogue on old problems, many shared the feeling that we were only in the infancy of using design to guide the future of healthcare. Some labs spoke about how their teams are interested in exploring how foresight methods and systems thinking can be integrated into the design process to enable valuable dialogue and ideation at the strategic and systemic level. The ability to elevate design to the level of organizational or systemic innovation

was shared by numerous people. Design may have the ability to nudge human systems forward, changing cultures along the way. A lab described this process as:

"For us, we are looking at how you can integrate systems thinking and foresight into the design process. To achieve culture change, how do you engage people in more complex dialogue about the future? This is the next generation beyond design thinking. We recently did a futures workshop imagining possible future scenarios ten years out. This allows stakeholders to go beyond incremental thinking, to be more expansive in their thinking and to incorporate trends and influences outside of health care into the design process."

Future of the Design Lab in the Hospital

Following questions on the future of design in healthcare, each interviewee was asked to reflect on their own lab and what they might see as possible future directions. It was interesting to note that a number of labs felt they were at an existential moment in their existence as they matured in their use of design and the organization's acceptance of their design practice. Some felt they wanted to do more and to play a role in reshaping the health system, others felt they needed to pivot so that they could reframe their value in the organization. As the labs in scope for this project were varied in terms of their age, it did appear that reframes in their approaches moved in 3 – 5 year cycles. Some of the key themes that they reflected on included the following:

1) Shift from Ideas to Implementation – Labs shared that although they have had success in scaling some innovations, there was still more to be done in moving ideas to implementation. Some labs felt that they had been able to start small finding success in local solutions but they now wanted to establish how they might offer more value. One lab referenced how a design approach can support teams with implementing ideas that have been successfully tested but never scaled. Using design can help move ideas along a continuum from ideation to a focus on

implementation, scaling and sustaining innovations.

2) Local Design to Systems Design – Responses related to the future of design also indicated a desire to position the lab as an enabler of system change. Whether it was to reimagine the future of healthcare or to enable a co-design process at the systems level, labs were keen to advance the impact of their work and to use design as a strategic capability in the organization and system. Examples of this were how a hospital may reimagine its business without the need for a physical hospital or how it might design a hospital without waiting rooms. Some also framed this dialogue as moving from tactical engagements to systems based ones or from working on smaller scale projects to larger ones. Many sought the ability to move towards the transformational level of change.

3) Further Entrench Experience as a Valued Outcome – Some labs sought to advance an emphasis on the patient experience as a valued area in which to innovate. The impression was that healthcare still had a lot of progress to make before they reached the level of other industries when it came to creating exceptional experiences. Labs saw their own value in this space and some saw advancing this as core to their future efforts.

4) Design as a Core Capability – An interesting insight from a few labs was that they wanted to move design towards a core capability in the organization. One interviewee spoke about moving design practices situated in a lab to a capability that is ubiquitous. Interestingly, this was only shared by labs that were more mature in their evolution possibly indicating a refinement in approaches as one gains experience using design in a hospital.

Advice to Other Hospital Design Labs

The final question in the interview sought advice on the future of design in healthcare. Insights clustered into the following themes:

1) Be Rigourous – Advice again revolved around the need to establish design as an accepted practice given the evidence-based paradigm of medicine and healthcare. Part of this acceptance was understanding design's place in the organization and in what way it should be positioned. Some spoke to its impact as drawing more people into design and getting people excited about change. Further, some spoke to the need to match the logic of medicine with that of design. In essence, design does have a logic to it based in the rigor of the design methods used. It also relies heavily on empathy and emotion and in some ways that is the power of design. Demonstrating the rigor-ous logic to design will help people understand its place in the medical environment as it competes with more scientific approaches to change and the research agenda. One interviewee described this as:

"I see Human Center Design becoming more legitimate within the scientific community. I think there's room to expand and educate our clinical partners and our academic partners on the rigour of Human Centered Design. I don't want to turn it into a science but we have a defined methodology and we have a defined process. I'd like to see an even match between human centered design as a research methodology and that of more traditional scientific approaches in healthcare."

2) Hold on to Core Ideals of Design – Design is about being generous, optimistic, creative and seeking new ideas. All of these are needed in healthcare and should be embraced by the designer working in the healthcare space. Bringing these attributes into healthcare institutions can sometimes be met with skepticism; but it can be overcome by being true to design's principles.

3) Understand Complexity of Healthcare – The number of designers and people interviewed that did not come from a traditional healthcare background was notable. It was also interesting to hear them share about their experiences in healthcare compared to other industries. It was shared multiple times that designers in healthcare need to take the time to understand the complexity of the healthcare environment and understand the motivations of stakeholders working within it. Two people mentioned that it was the most complex environment that they had ever worked in but they also mentioned that it felt like the most rewarding. Others also mentioned that they experienced attrition of designers who grew tired of the slow pace of change in healthcare and the inability to advance their ideas. One interviewee captured the difficulty in designing in healthcare as:

"You need to have an understanding of the com-plexity of the healthcare system to be able to use design methodology in it. Don't just come here with your post it notes and think you will solve the world's problems because you will get kicked out real fast."

4) Be humble – It was also shared by various interviewees that designers in healthcare need to be humble. The environment is competitive and stakeholders are often high-achieving and very successful in their own domains. Designers coming into this environment should be humble about what design can achieve and how they might offer value.

Chapter 3 – Sense Making - The Synthesis Map

People interviewed in this research generously shared their experience in leading design based initiatives in healthcare. The synthesis map visualizes responses from participants and frames the lab in the context of a health innovation ecosystem. The intent behind the creation of the map was to synthesize the findings in a manner that would make the insights available for future use. The map may be used as an analysis tool for hospitals interested in investing in a lab or as a thinking tool for the design practitioner or leader to better understand some of the strategic decisions made in the construction of a lab. It may also be used by internal or external stakeholders as an opportunity to view the lab within the context of the hospital and to visualize its sense of place.

The synthesis map ends with design principles for consideration in building a lab or design practice in a hospital. These are framed within the context of a business model canvas for hospital based design labs or what has been named the Health Design Lab Canvas. The canvas, supported by the synthesis map, can enable a strategic conversation about design in hospitals.

The visuals in the synthesis map were built from insights generated in this research. The metaphor of a flower was used to draw focus back to the intent of the lab; to nurture and grow innovations that meet people's needs. The map is divided into four sections which include the lab's purpose, its place and its impact. The preceding section, (Chapter 2) contains the detailed insights used in each section of the map. The following sections break down each of these key elements:

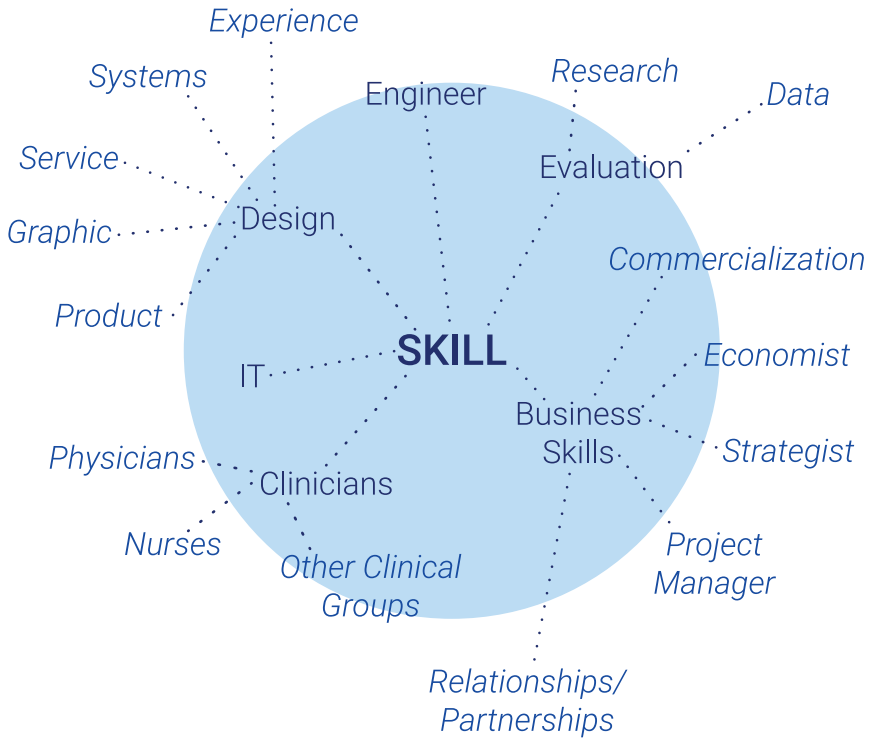
1. Purpose - What does a design lab look like?

This section of the map highlights key elements of the lab's rationale and structure. It also considers the labs "point of view" or what it is trying to achieve.

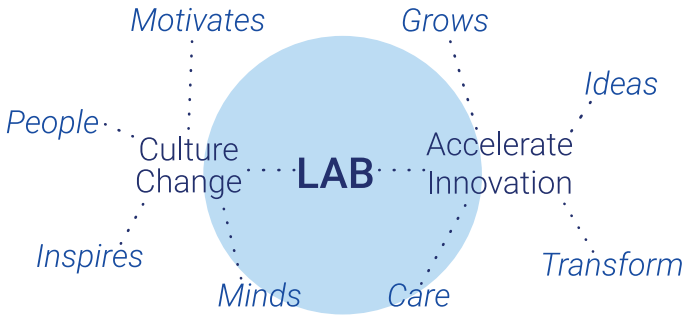
Tying the rationale, focus and metrics into one bucket of items for consideration allows the user of the map to see the importance of setting a direction. This also allows the lab to consider the resources and skills that it may need to get there. Matching resources to purpose was mentioned by multiple labs as a key ingredient to achieve success.

The following areas are outlined as key considerations in this area:

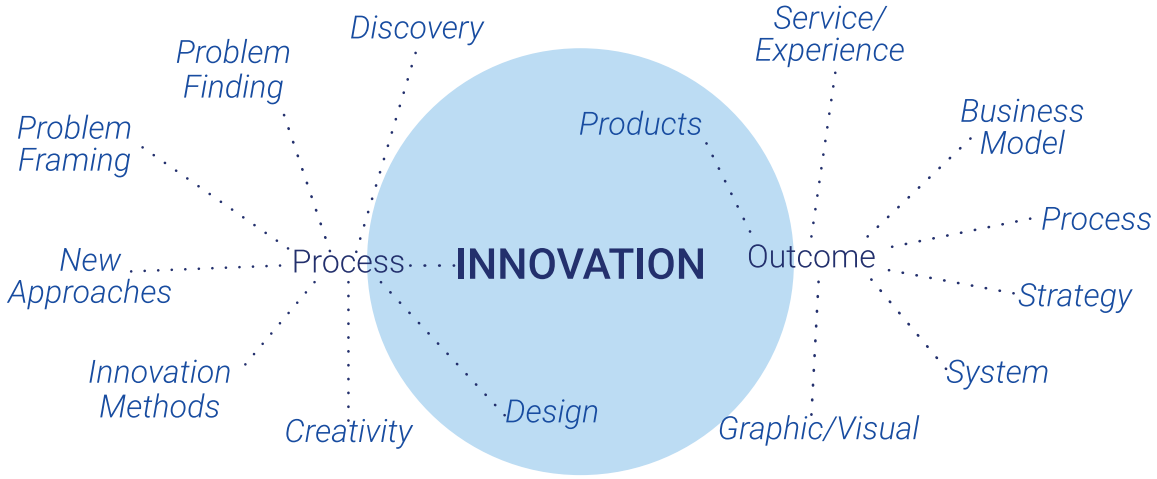
a) Skill Mix – Labs listed a broad range of design skills including graphic, service, experience and product designers. Physicians or other clinicians, engineers, strategists, economists, researchers, project managers, IT staff, data specialists, business manag-ers and commercialization experts were also listed. The key distinction in why certain mixes were chosen was the intent of the lab, or what it was trying to achieve.



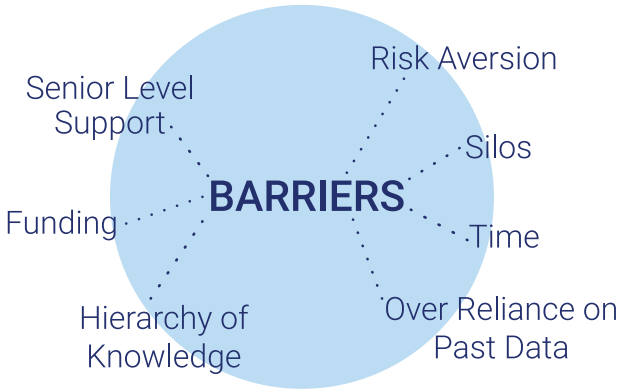
b) Rationale – The lab is an enabler of culture change and/or an enabler for innovation. Both were mentioned in interviews. It's a space to inspire, motivate, grow ideas, lead, transform, re-imagine and catalyze. It can also be a space to imagine and built a better future. The lab's rationale is grounded in its manifesto or mission which is built from its strategy.



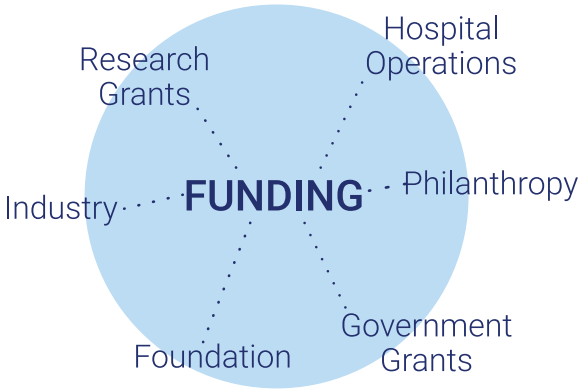
c) Innovation Focus – Building on the rationale for the lab, is the focus of its work and the types of innovations that the lab intends to create. The range of innovation can move from products to systems innovation but understanding the intent was deemed important by those interviewed. Design may also focus on improvement activity if that is the choice of the lab and the organization.



d) Barriers to Innovation – Anticipating barriers to innovation will allow the lab to anticipate what it may need to overcome. These include time constraints, funding, hierarchies, risk aversion, over reliance on data and silos.



e) Funding –Labs should consider a balance of funding sources in creating their lab. Sources may include stable base funding from the organization, research dollars, foundation grants, philanthropy, industry contracts and government grants. Most labs shared that they did look at a variety of sources for sustainability.

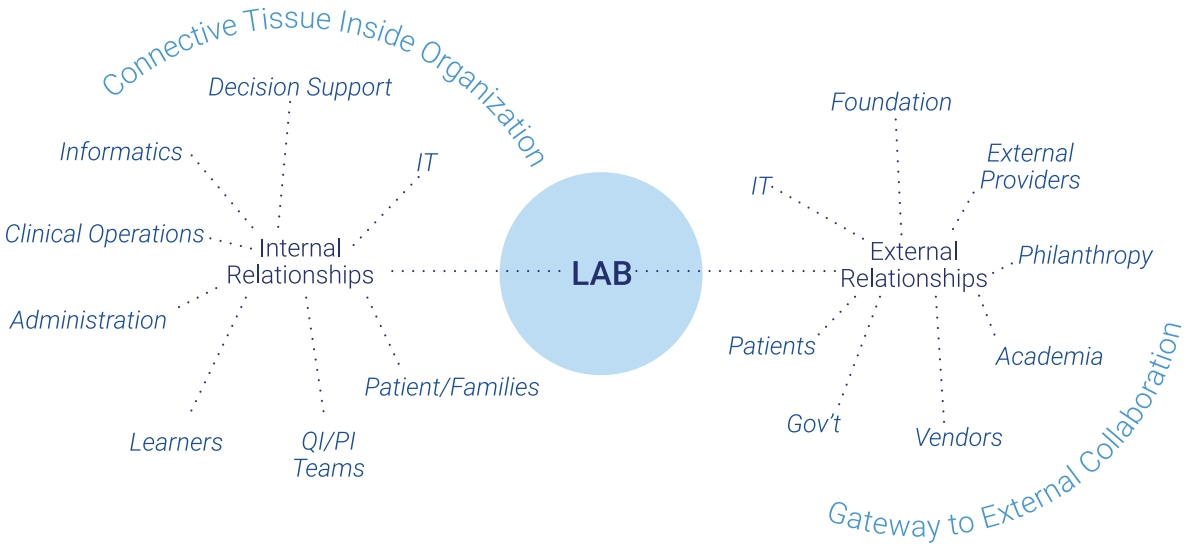


2. Place - What is the design lab's sense of place?

This layer of the synthesis map depicts the relationships the lab has with internal and external stakeholders and the direction of its work whether it was improvement, innovation or a combination of both. Understanding the lab's "place" in the organization is critical to understanding how it is going to meet its objectives.

Place revolves around connecting people to the mindset of its work, improvement or innovation.

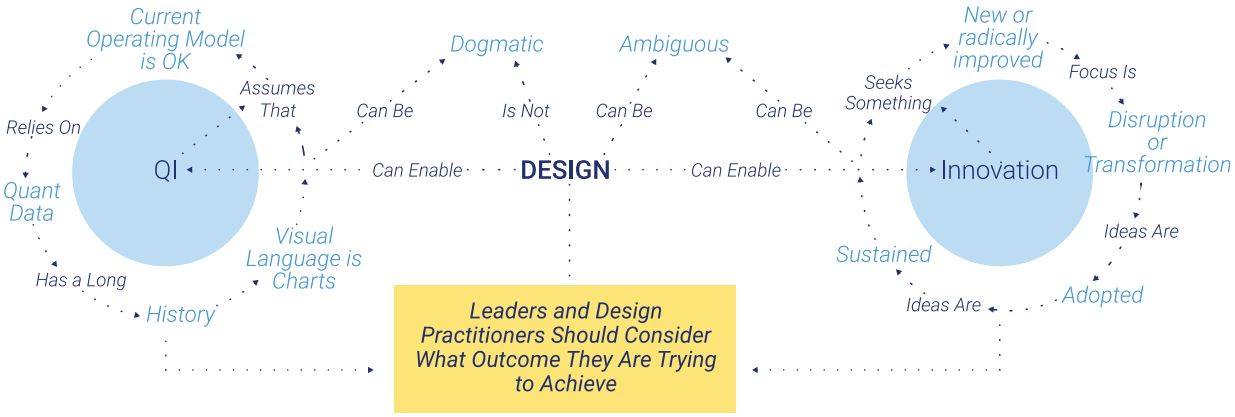
a. Internal relationships – The lab has relationships with IT, decision support, clinical teams, learners, process improvement/QI teams and patients and families. These were a number of stakeholders mentioned in the research. Interviewees shared that the lab must be thoughtful about who they engage with and seek out ways to nurture these relationships. Their credibility and success lies in the ability to help and support internal stakeholders through change initiatives. They will also rely on support services to scale and sustain innovations so internal partnerships are important to build.



b. External relationships – The lab has a number of external relationships that are either partnerships or transactional. These may include funders, innovation partners, government, academia, vendors, IT firms and other healthcare providers. The partnerships that the lab establishes will be a key ingredient in the outcomes that it will achieve. Care must be given to building strategic partnerships, alliances and relationships in order to help the lab and organization achieve success.

c. QI and Innovation – This section depicts how innovation and improvement were described and the differences and similarities between each. Framing your design

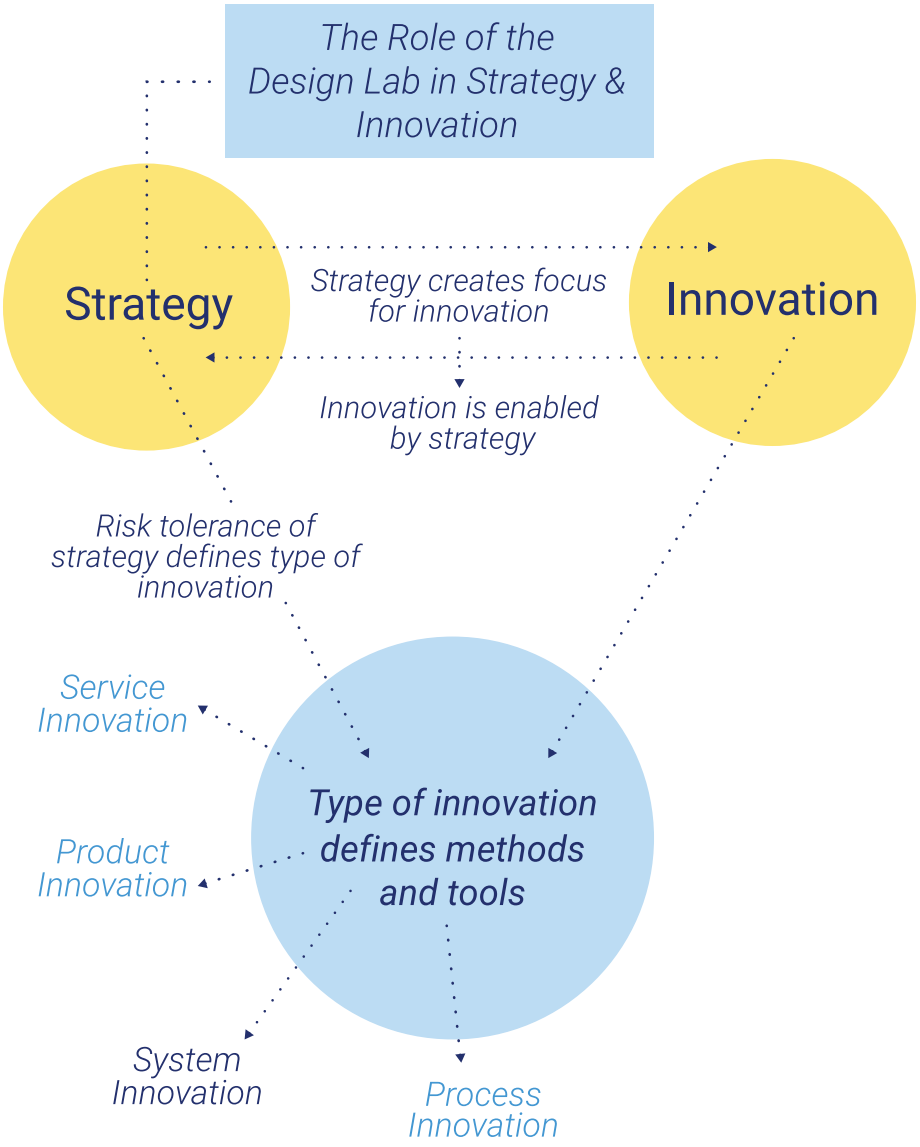
efforts within the realm of improvement (process innovation) and/or transformational innovation is important to set expectations and define the scope of initiatives. This section of the map depicts the relationships between the two and how they link to your intent.



3. Impact - How are design labs making an impact?

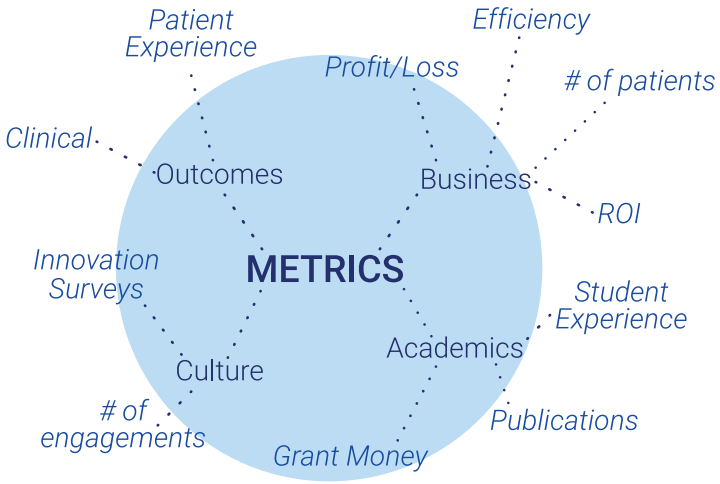
A consistent theme in this research has been to align design efforts with intent and strategy. Doing so enables designers to focus their creative efforts around innovation spaces identified by the organization and community. Barriers to change are difficult to overcome, having a clear strategic focus enables the lab and designers to align its efforts with others in the organization. This also provides clarity for stakeholders so that they are able to interact with the lab in a transparent manner. Mention should be made that the strategy of the organization should also be inclusive of user needs and design can enable the development of the organization's strategy itself. Labs may also develop their own strategy separate from the organization but it should be careful on how this is positioned. This ensures that they user's voice and needs are enshrined in the strategic process as well. Focusing on intent and clarifying the lab's role on the improvement/innovation continuum were deemed important takeaways from this research and are outlined in the map. The political realities of each organization will determine the independence or dependence the lab has with the organization.

a. Strategy and Intent – Feedback was consistent from interviews that design could be effective in enabling any number of changes in your organization. Understanding what you are trying to achieve and the relationship the lab has with the organization allows the lab to build meaningful relationships with all stakeholders. Most labs had defined a manifesto or mission to reflect their design point of view or intent. Many also pointed out that the creation of the manifesto was in itself a creative process that enabled shared ownership in the lab's future.

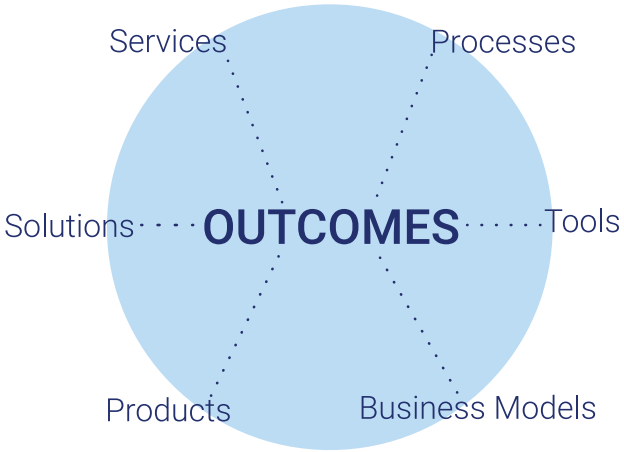


b. Reporting Structure – Reporting structures seemed to influence the nature and ambition of the work of the lab. Labs indicated that they reported to Quality, Strategy, Innovation, Medical Leadership, Research or Patient Experience. Each had separate considerations as it relates to strategy and intent but none seemed to have complete independence in what they did.

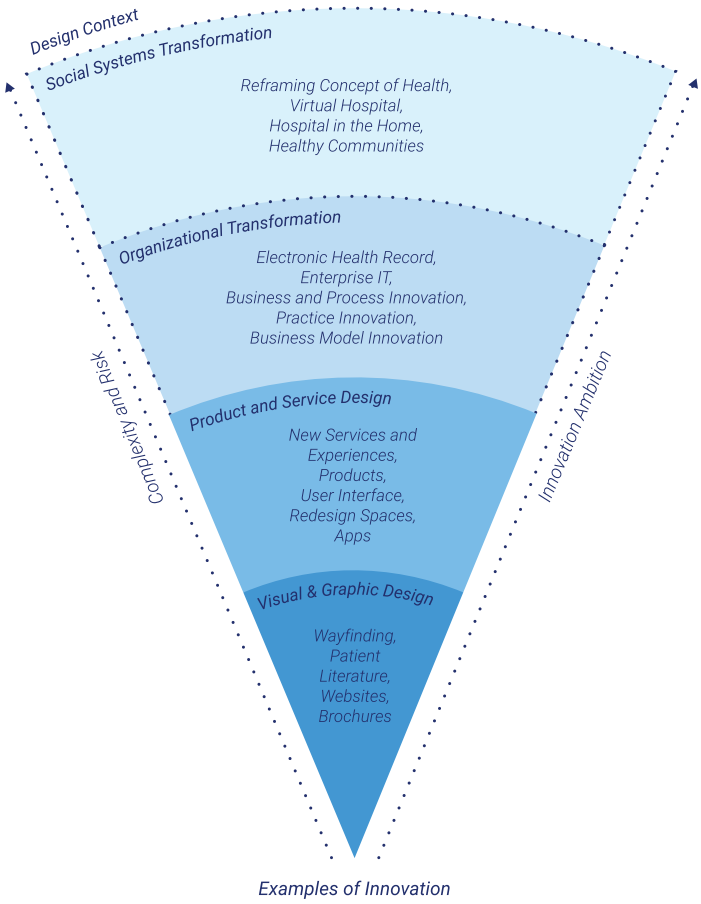
c. Metrics – To determine the impact that the lab is having on the orga-nization it is important to attempt to quantify the difference it is making. This may include a range of metrics including business outcomes, clinical and experience out-comes, cultural metrics and metrics associated with research and academia.



d. Outcomes - Labs shared evidence of success in using design in healthcare. This included multiple projects where they have been successful in developing new tools, processes, solutions and services that have had a meaningful impact on patient experiences and outcomes. Additionally, longevity and reinvestment by the organization was shared as a proxy measure for success. Lastly, labs have been able to win contracts with external entities for design engagements indicating value in their work.

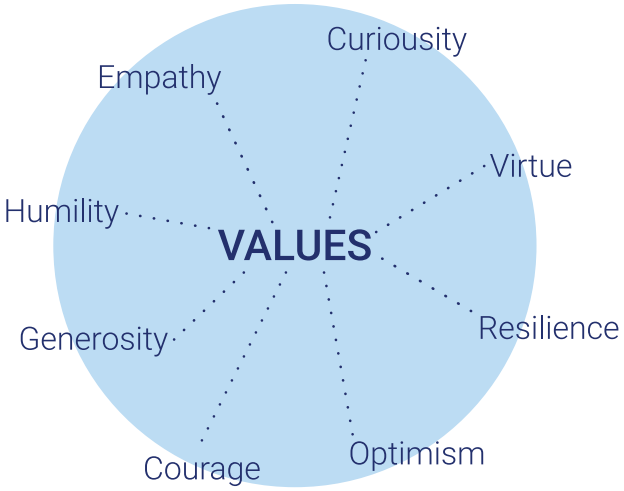


e. Ambition and Maturity - Design leaders in hospitals were clear in establishing the link between strategic intent and desired outcomes. They also shared that design could enable transformation and better health and experience for patients, families, staff, physicians and the community. Using the Jones/Van Patten Design Domains model as its inspiration, a model was created to better understand a lab's ambition and maturity while provoking dialogue on what a lab may achieve.

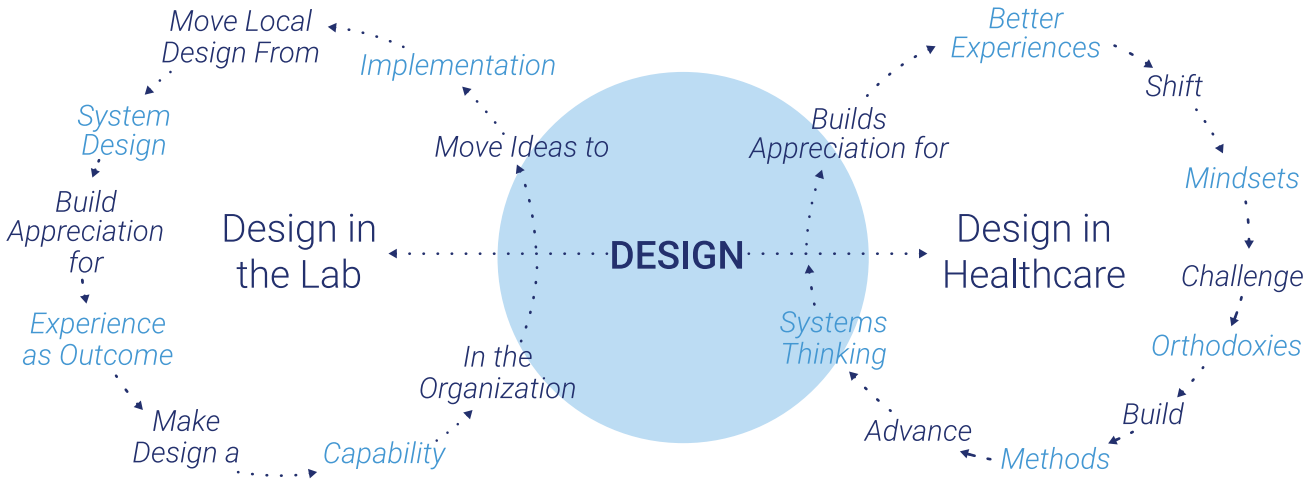


4. Future - How might we build or critically assess a design lab?

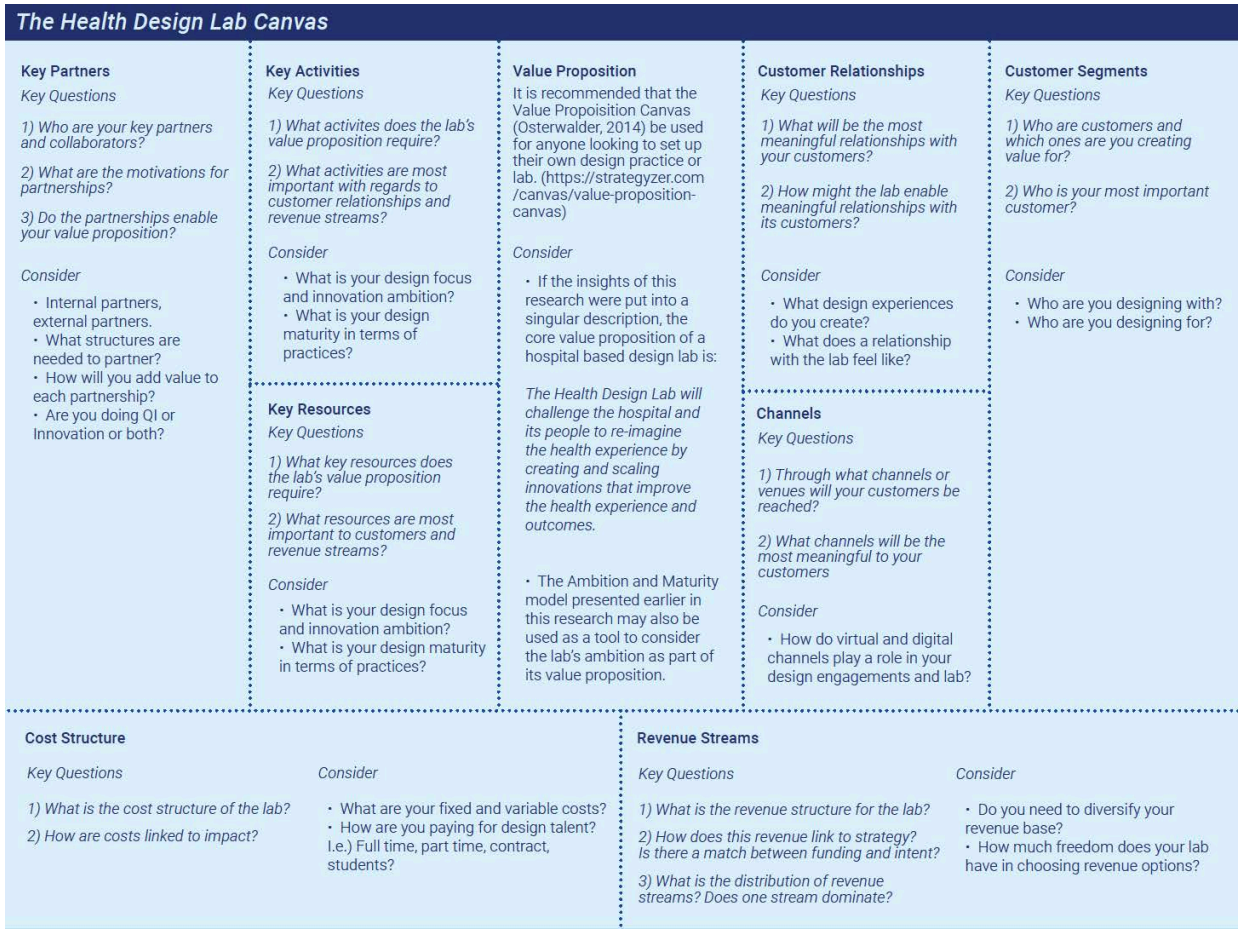
a) Values – Interviewees shared a number of values based suggestions and general advice for those seeking to use design in healthcare. Taking from this wisdom, values were embedded into the process map to consider when building your design practice.



b) Future of Design – Design has a number of possible future uses in healthcare including leveraging the focus on improving experiences, shifting mindsets and challenging orthodoxies. Design may also impact on strategy, foresight and systems based innovation. A consistent impression left by many interviews was that design can have a much larger impact and influence transformational changes in healthcare. It may also be critical in shifting from a provider centric focus on sick care to a system focus-ing on health and the needs of communities and citizens. The lab can play a role in this future but organizational leadership will have to enable it to be successful.



c) The Health Design Lab Canvas – The next section will go into detail about the Health Design Lab Canvas and accompanying design principles. These can be used to create a new lab or to review the work of a current design lab in comparison to insights from this research.



Chapter 4 – Health Design Lab Canvas and Design Principles

This research has been able to advance the understanding of a design lab's purpose, place, impact and future in a hospital. But what should an organization consider when building its own lab or seeking to pivot a current lab's focus? The Synthesis Map allows for a dialogue on the insights generated through this research. The next step is how might a lab be built using the these findings?

To consider key elements for creating your own lab, insights were placed into the Business Model Canvas. The Business Model Canvas (Osterwalder, 2010) is a strategic management template for developing new business models or documenting current ones. It is a visual chart with elements that portray a business' value proposition, infrastructure, customers and finances. It was initially proposed by Alexander Osterwalder and has since been used as a tool for developing new businesses or analyzing currently existing ones.

For the purposes of this work, the Business Model Canvas has been used to synthesize the findings of this research in order to allow the end user to consider its elements when planning their own lab or analyzing current offerings. It is a Business Model Canvas for Health Design Labs or what is named the Health Design Lab Canvas. To support the use of the canvas, eight design principles are offered which articulate the most relevant insights from this research. It is hoped that together the Health Design Lab Canvas and the accompanying design principles may allow this research to be used by others seeking to advance health design in their own organizations.

1. Infrastructure

Key Partners

Key questions for consideration in this section are:

1) Who are your key partners and collaborators?

2) What are the motivations for partnerships?

3) Do the partnerships enable your value proposition?

The labs interviewed depicted a broad array of internal and external partners that an organization needs to engage with for the success of the lab. The lab acts as the connective tissue inside of the organization and it is the gateway to collaboration externally. Internally, administration, clinicians, staff, IT, informatics, QI teams and patients and families were all mentioned as critical enablers of the lab's activity. Externally, a broader array of stakeholders was mentioned including foundation, external funders, government, private firm, not for profits, social organizations and patients and families. A consistent insight was that partnerships, whether internal or external, were guided by the strategy or intent of the lab and the projects that it has taken on. Consideration should be given to choosing partners as some labs mentioned work being driven by the mandate of others when the wrong arrangements were entered into. Sometimes, this was for reasons of sustainability but labs need to choose their partners wisely.

Motivations for Partnerships

An interesting component of some of the findings was that the lab may act as a body that can "de risk" the innovation process. This means that while it would be difficult to walk into a clinic to conduct a design engagement that would seek to eliminate patient visits, the lab can ideate within this scenario. The lab may be able to reduce the risk of innovation by creating a safe space for organizations to talk about and ideate

on potentially controversial or blue sky activity. Additionally, most hospitals are bound by complex arrangements related to procurement, finance and risk that sometimes make it difficult to work with private organizations. The lab can invite partners in to ideate around new solutions or processes that may one day be commercialized and it allows for safe space for this type of collaboration to happen. These partners can bring in new skills to the lab or hospital and even offer access to capital needed to develop new ideas. Labs that were moving in this direction talked about arrangements with their finance, risk/legal and privacy teams to satisfy the organization's obligations while working with external partners.

Inside the organization, partnerships were also created as a way to bridge everyday operations with innovation. That is to create time and space to innovate and think outside of the norms of everyday clinical activity. Some spoke to this aspect of the lab's work being the most rewarding where they could take front line clinicians and staff away from their work to create better experiences and processes but consider-ation must be given to how these partnerships were built as there is very little time and money to do so. Creativity in building appropriate internal relationships was ad-vised along with selecting the right projects to engage in so that there is a strategic fit, heightening the likelihood of success in their work.

Key Activities

Key questions for consideration in this section are:

1) What key activities does the lab's value proposition require?

2) What activities are most important with regards to customer relationships and revenue streams?

The design lab plays a critical function in the hospital. It is the nexus of inspiration, ideation, creation and implementation. Depending on the strategy and focus chosen,

the lab brings people together to understand needs, frame problems, develop prototypes and to test changes. The creative process is a core activity in the value proposition and the design lab leverages the tools, methods, skills and mindset of the designer to deliver results. Generating new ideas or reframing old problems are core elements of the labs' activities offering time and a safe space for clinicians and patients to co create together to build a better future. Some labs cited examples of moving past the prototype phase into building solutions that were being scaled and commercialized. For those labs interested in moving into this phase of the innovation process, it will require new and different skills, processes and competencies to be developed in order to be successful.

The activities most important with regards to customer relationships are the creative process, curating the design process from ideation through to implementation and bringing together diverse groups of people in co creation. It is quite often the ability of the lab to bring in diverse groups of people to ideate together where the lab will find value in the organization. At its foundation, the lab needs to be able to curate amazing design experiences that will keep their customers engaged and requesting increasingly sophisticated work. As the reputation and value of the lab grew, many spoke about having to balance requests for their time with revenue generating design work. Labs may have to balance these engagements depending on the revenue model of the lab in each organization.

Key Resources

Key questions for consideration in this section are:

1) What key resources does the lab's value proposition require?

2) What resources are most important to customers and revenue streams?

The lab will require a number of physical and non-physical resources to be able deliver on its value proposition. The following areas should be considered:

Physical

Although not all labs interviewed cited specific physical space for the focus of their design work, those that did mention it indicated that it does provide a space for people to get excited, feel inspired and to get away from their everyday work environment. As the intent of most work with partners in the design lab is to create something new, creating a physical space where compelling design engagements may happen is important to consider. Physical space for design also tends to become something of a drawing point in most organizations interviewed where external funders, donors and partners can come to be inspired or work with partners inside the organization on innovation efforts and it can be a flagship destination to inspire creativity for those both inside and outside the organization. Depending on the ambition of the organization and lab, physical assets ranged from white boards, post its and markers to full maker labs with 3D printers, industrial presses and wood working shops.

Intellectual

For those labs focused on commercializing intellectual property, processes need to be put in place to govern IP, contracts with external partners, privacy, copyright, patent applications and management. These labs often had people in specific roles with business or legal backgrounds who could manage the intellectual property devel-oped in the lab. The focus of a lab's work is on innovation and the scale or ambition of these innovations usually dictates the types of skills or processes that will be needed with regards to managing intellectual property.

Human

The design lab also has a variety of skills and roles needed depending again on ambition and focus. Some labs mentioned that design skills are often at a premium in their markets and that it was difficult to source talent. Additionally, labs also men-

tioned that designers were coming from industries outside of healthcare because they were attracted to the mission of healthcare which is to make things better for people. This was a key enabler of their work as they were able to attract talent and skills who would be paid much higher in other settings. Some also mentioned that these people often became frustrated at their experience in health care when they felt stifled by the pace of change, the hierarchy or a lack of ambition by the organizations they worked in. Matching design talent with the focus of the design being done was also important. For labs focused on product design or user experience, they did need to focus on specific design skill sets. For those moving towards system design again there are nuances to the types of designers you are hiring.

Outside of design skills, a variety of other skill sets were cited depending again on focus. Business skills, evaluation, research, IT, project coordination and communications were all mentioned as critical areas for consideration. A focus on hiring a balance of enthusiastic change leaders and people with technical skills was also cited as a critical enabler by one lab. People that are enthusiastic, humble, generous and optimistic were said to be able to learn the design process on the job and support a team of designers on their mandate. There did seem to be an ability to hire a team of formal designers with apprentices who may not have formal design training. With constraints on budgets, this approach seemed an interesting one to ensure sustainability.

Financial

Sustainability is a key consideration for all labs as it is for all areas of most hospitals and healthcare organizations. A critical enabler of many hospital labs has been their funding model. Many labs shared that they were funded predominantly from oper-ating funds. They had steady funding available year over year linked to a senior leader's portfolio in the organization. This allowed for better financial planning and the ability to link the lab's work to strategic priorities. Consideration should be given to

setting up a multi-year funding arrangement in the organization as some labs indicated that their innovation processes often crossed years and not quarters and stable funding enabled their ability to succeed.

2. Offering

Value Proposition

It is recommended that the Value Proposition Canvas (Osterwalder, 2014) be used for anyone looking to set up their own design practice or lab. (https://strategyzer.com/canvas/value-proposition-canvas) This resource will allow the user to create a value proposition designed for their local environment and interests. When considering the value proposition, consideration should be given to the intent of design efforts and ambition of the strategy. The Ambition and Maturity Model previously shared in this research may provide a tool that is relevant to design to guide discussions on what the lab is seeking to achieve, the ambition of the outcomes that the lab wants to generate and the tools and skills needed to enable it.

If the insights of this work were put into a singular value proposition of a hospital based design lab would be:

The Health Design Lab will challenge the hospital and its people to re-imagine the health experience by creating and scaling innovations that improve the health experience and outcomes.

Broadly, this value proposition describes what was heard across the interviews and gives an insight into the rationale behind the development of design labs interviewed in this project. Labs shared a variety of approaches to driving value in the organization. Some spoke of impacting culture, others spoke of creating compelling experiences, some spoke of new business models and others spoke about products that were created. Regardless of the nature of the innovation, labs spoke about creating something new and different than what was currently offered today.

They spoke about transforming the experience for healthcare providers and patients and families. Many responses on value were framed in words like imagine, catalyze, improve, transform and create. The "lab" was a space where all of this could happen. Interestingly, some organizations that have been using design for a longer period of time (5 years plus) have started to augment the lab's offerings by making design a core competency or capability. The intent or value of design remains the same as this value proposition but they have shifted their ambition moving design past a physical or temporal entity into an organizational mindset that is enduring.

3. Customers

Customer Segments

Key questions for consideration in this section are:

1) Who are your customers and which ones are you creating value for?

2) Who is your most important customer?

Once leaders of the lab consider the intent or ambition of its work, its customers may be identified. Labs mentioned a broad variety of customers in two ways. The first customer segment was those they were designing for, or the people who would yield the value of the innovations that were created in the lab. Depending on the scope of the engagement or focus of the lab, this could be an individual patient, a cohort of patients like those in a department, unit or clinic, a particular disease group like cancer patients, or entire communities. Setting the focus of the design lab determines which of these customer groups becomes important.

The second way in which customers were identified are those that are seeking to innovate or to "do design." These are clinical operations, physicians and other clinical provider groups, funders, external bodies wishing to engage with the lab or researchers. These groups often purchased services or time with the lab and

as such became customers. Careful mention should be given that sometimes these customers could drive the mandate of the lab if the lab became too dependent on their funds as the sole source of revenue.

For many labs, the primary customer of the lab is the organization itself. As such, careful consideration should be given to the relationship with the organization, the link of the lab's strategy to the organization's strategy and where the lab exists to inspire and create beyond the ambition of the organization's strategy how the inevitable tension will be managed when the lab is pushing the organization's mandate. There were examples cited of leadership of the lab growing disheartened and dissatisfied with the organization the lab exists in as the ambition between the two was not matched. Often the lab is seeking to move outside the boundaries of the hospital itself whereas the hospital is asking the lab to optimize current operations. This is a key insight and something that needs to be managed when considering customers in a hospital-based design lab.

Labs should also consider what is the role of the patient, citizen or community? Are they a customer? A supplier? A partner? They may be all of these but this should be acknowledged as part of discussions in each.

Channels

Key questions for consideration in this section are:

1) Through what channels or venues will your customers be reached?

2) What channels will be most meaningful to your customers?

Design is a tactile endeavour and human centered design involves observing humans interacting with their environment, interviewing them, understanding them and creating with them. This builds the need for physical space to engage with customers and/or the ability to be versatile in bringing a design lab to whatever setting

you are designing in. The vast majority of labs interviewed indicated that they did have their own physical space to co-create with and engage their customers.

An interesting insight from the research also indicated that more labs were adopting virtual or tech solutions to engage with customers. Using social media, online forms and smart phones for quick touch points with customers was cited ways in which labs were trying to be creative in reaching customers. Particularly with clinical partners whose time was often viewed as being constrained, designers were looking at new ways to use virtual media to engage these people in the design process. Addition-ally, going to the clinical spaces these people work in and engaging them while they have downtime in their busy clinics was another method that designers were using to engage. Hospital environments seemed to be less than ideal environments and indeed not very “lab” like so designers find themselves using creative methods to reach users and gather insights.

Customer Relationships

Key questions for consideration in this section are:

1) What will be the most meaningful relationships with your customers?

2) How might the lab enable meaningful relationships with its customers?

Relationships with customers within the lab are usually framed around co cre-ation. Those engaging with the lab are seeking to be inspired to develop new solutions to their problems. Designers will often ask customers to focus on framing or reframing their problems prior to moving to solution but the lab will curate an environment that allows customers to co-create solutions with end users. Additionally, some labs have mentioned that they have been able to build communities of change makers at a local level that engage with the lab on a variety of change initiatives.

Labs may look to their own design methods and tools to create meaningful rela-

tionships with customers. What are your customers' needs? How does the lab enable connections and relationships with each customer segment and do customers value their experience in working with the lab? Designers and the lab should be well placed to enable outstanding customer experiences through the design process itself and through business partnerships. Many entities, both inside and outside of the hospital, will be looking to have a tangible outcome of their partnership or engagement with the lab and this should be considered while building meaningful relationships.

4. Finances

Cost Structures

Key questions for consideration in this section are:

1) What is the cost structure of the lab?

2) How are costs linked to impact?

Most labs function on a blend of fixed and variable costs depending on the engagements and partnerships the lab has at any moment in time. The labs have a core group of design talent working in house but many mentioned the ability to contract out services to other designers or engage student designers as the number of projects grow. A blend of in house staff, contracted designers and/or students seemed to be the optimal model that most labs adopted allowing for the ability to execute on a core set of design projects while scaling up a certain level as needed. Variable costs seem to be project dependent and focused on design talent. Fixed costs include overhead related to lab infrastructure and other staff.

Revenue Streams

Key questions for consideration in this section are:

1) What is the revenue structure for the lab?

2) How does this revenue link to strategy? Is there a match between funding and intent?

3)What is the distribution of revenue streams? Does one stream dominate?

Design labs cited a number of different revenue streams for operations. When considering revenue streams, it's important to consider multi-year funding and stability as labs articulated that annual funding cycles were a disadvantage related to scaling innovation and in attracting and retaining talent. Streams including operational dollars from the hospital, foundation or donor dollars, project based revenue from internal and external partners, government grants and research dollars. Each stream has advantages and disadvantages but dependence on any one stream creates a tension in terms of the labs independence and ability to set its own design objectives. Labs that seemed to be making the largest impact in terms of the ability to implement and scale ideas did share that they had stable operating fund and a strong link to senior levels of the organization.

Design Principles

This work synthesizes insights from global leaders in healthcare design to allow healthcare leaders or design practitioners the ability to create their own lab or critically assess their current lab using these insights. To allow for this possibility, the Health Design Lab Canvas was developed to allow for strategic planning related to a new or existing lab. In developing a new lab or when critically appraising an existing one, eight design principles should be considered. They are:

1. Align Ambition with Design

Leaders of hospital based design labs have spent a great deal of time focusing on what they want to achieve. Most labs articulated a manifesto or mission statement and were able to define the intent behind their design focus while also sharing a desire to do more. Their ambition did not seem to be matched by the work they were doing and it was a key tension that must be considered. This misalignment in terms of expectations by stakeholders and the designers working in the lab often led to dissatisfaction or a feeling of unfulfilled expectations.

The Innovation and Maturity model used in this research is a tool that can be used to analyze the ambition of the lab and the outcomes that have been achieved. Users can place their ambition on the model and also identify where they are currently being effective in achieving outcomes. The match or mismatch between these two areas is often the zone of discontent unless there is a clear plan on how to close the gap. It is important to consider ambition as it will drive the strategy of the lab and how it should be built to achieve success. In establishing ambition, it's also critical to consider the strategic ambition of the organization in which the lab is based. The mismatch in these two ambitions frequently leads to dissatisfaction or animosity between the lab and the organization itself.

2. Match Ambition with Skills

Closely linked to setting your focus and ambition is building your team to achieve success. While designers are at a premium in most markets, organizations should attempt to match their ambition with needed design skills. Labs mentioned graphic, service, experience and product designers as people with unique skill sets working in healthcare design labs today. Many labs mentioned a more generalist approach as they started to build their lab but as the lab matures, the complexity of the projects it is involved in often requires specific skills to achieve success. For those

labs moving into commercialization and scaling products that it develops, a broad array of skills outside of design are also needed to achieve success. All of this starts with setting your ambition but those labs that seemed to achieve success also articulated a link to thoughtful consideration of new skills needed to achieve success.

3. De-risk Innovation

An interesting insight from this work was the ability of the lab to both reimagine what is possible and to de-risk the ability to do so. In most parts of a hospital, the focus is on providing direct patient care every single day. There is very little time to step back and reimagine possibilities in how the organization may build exceptional experiences or reframe the concept of health. The lab becomes that place in many organizations. In some ways, it specializes in the art of what may be possible but this focus also comes with obligations in terms of building relationships both inside and outside the organization.

Hospitals are traditionally quite risk averse. Dreaming up new concepts on how to deliver better services is part of its mandate but the ability to invest time into this process is limited. The lab may build relationships with partners inside the organization to allow them this time and space. Thoughtfully engaging with stakeholders requires a level of creativity that the lab must consider but it can draw in people that do not normally connect every day in the organization. Bringing together these disparate groups is a critical function of labs and in some ways enables them to become the connective tissue of the organization in terms of creativity. Nurturing these relation-ships including those with other internal change leaders like the quality improvement team is an important consideration.

Establishing relationships outside of the organization is again linked to the ambition of the lab. The lab may become an entry point to organizations and people who wish to innovate with the hospital. This does not normally happen in everyday busi-

ness and the lab opens the door to collaboration. Careful consideration of partners and a transparent process to engage can be the starting point to creating new products, processes or services that may help transform an organization. Labs should consider these partnerships as assets that need to be leveraged to maximize their innovation capacity and ambition.

4. Put Patients on the Team

Another design principle is engaging patients as part of the core team. Many labs spoke to their interactions with patients both within the organization and externally. This often involved specific engagements with patients on an episodic or opportunistic basis depending on the project. Patient involvement in design was often referenced within the context of how design engagements were done. Patient advisors, ethnography, interviews and involvement on design teams were all mentioned. Patients as members of the lab team itself was not mentioned which was an interesting insight. Consideration should be given to how a lab may lead within the hospital by having patients as members of the lab team itself. Positioned as the front face of the lab, radical engagement with patients can be something that the design lab champions. User centered design in a hospital cannot be enabled without patient involvement and the lab is well positioned to promote radical engagement as part of its existence.

5. Focus on Relationship Between Lab and the Organization

Some labs exist outside of the operating system of the hospital they are located in. This allows them freedom to choose areas in which they will seek to innovate or focus on meaningful dialogue about future possibilities but this is a chosen path. The lab is built with this intent and focus and it is intentionally placed outside of the organization's strategic parameters. It is when the lab seeks to operate outside of the

strategic parameters of the organization while the organization wants to use the lab to advance its mandate where there seems to be tension. Consideration should be given as to the lab's place in the organization and its ability to interact with external partners and the external environment.

6. Choose QI and/or Innovation

Many labs spoke about an inherent tension in hospitals between the Quality Improvement or Process Improvement teams and the Innovation or Design Team. Tension often arose from an unclear understanding of each other's role and the value they bring to the organization. This may be overcome by clearly defining the role of the lab in the context of the change agenda of the organization. Most labs spoke to qual-ity improvement being a form of innovation often framed around process innovation. Design can play a critical role in advancing the improvement and innovation agendas in an organization but the lab must seek ways to define how it will participate in the change agenda. QI has a head start on design in almost all hospitals. Millions, if not billions, have been invested in teaching QI around the world and design is in some ways a new player in this market. The lab should seek ways to help people make sense of design's role in this agenda and offer explanations as to how it can complement or advance QI and how it can support innovation in a hospital. Importance must be given to considering how design and the lab are placed in or how they might lead either agenda and what resources are required to achieve success.

7. Assess Your Design Maturity

While the lab and organization will set its innovation ambition, it is important to also consider the maturity of design practices in the lab and organization. This research has demonstrated that as organizations mature in their use of design they sometimes will expand from tactical approaches to the use of design towards en-

abling design as core competency or capability in the organization. The lab itself will play a role in advancing the maturity and sophistication of its own practices and with time can enable design as an enabler across parts of the organization. The Ambition and Maturity model may also be used to assess organization maturity in the use of design and to frame a dialogue on ambition.

8. Strategy May Equal Impact

When designing a new lab or assessing a current one, the importance of strategy or a defined intent should be considered. The organization will have varying degrees of influence over the lab from total control to a loose affiliation, but the lab itself must completely understand the intent, ambition and desired outcomes for its work. Doing so enables expectations to be built, teams to form, appropriate skills to be hired and people engaged in achieving results. Without this level of focus, there is a danger that design becomes something that is resented in the organization or that the lab grows stale under the weight of unrealistic expectations or unfulfilled promise.

A clear intent towards the work of the lab builds confidence in the team and the ability for stakeholders to understand the type of work is being done. It also allows the lab to set the parameters around how it will engage with the external environment. Design labs have an opportunity to make an impact in their hospital and community; without a clear strategy or intent the likelihood of falling short will increase.

Chapter 5 - Next Steps

This research represented an opportunity to learn from early adopters in the use of design at hospitals around the world. What was found was that design is playing an integral role in helping many organizations reimagine the services and experiences they offer to their patients and communities. Local examples of meaningful innovations were mentioned by many lab leaders. Some organizations were moving beyond tactical uses of design to larger scale applications of it as a core organizational capability. Others have referenced successful use of design to effect change at a systems level.

This research reflects the environment in early 2018. Using insights from this research, a synthesis map was built. This map may be used by any organization seeking to develop its own design capability or for those that find themselves at a moment where they are reflecting on their current design practice or lab in their organization. Regardless of where the organization is in their design journey, the map has value as a reflective tool.

An output of this research is the Health Design Lab Canvas and its accompanying eight design principals. It is built on the wisdom of those labs interviewed in this work with a shared intent of improving design practices in healthcare around the world. It is intended that this be a prototype of a health design lab that we can continue to iterate on and that it may be used by anyone interested in creating their own health design lab or focus.

Possible Areas of Future Research

This research represents a starting point into exploring the health design lab and how it may be leveraged in the context of health systems innovation. Further research will bring a better understanding of possible future uses of design in health-

care. Areas of future exploration include the following:

1) Critical Analysis of Design Labs – This research supported a descriptive analysis of health design labs. It could be further enhanced by a critical analysis of design labs as a method for health innovation. While this research found that there were local examples of success, deeper analysis may uncover further evidence of impact.

2) Design Labs in Universities, Private Health Organizations and in Social Systems – This research included several interviews that were in other settings outside of hospitals also focusing on health. Using a similar approach, the data could be analysed to better understand these labs. Interesting research would be looking at enablers, barriers, rationale and intent to relate them to the hospital labs and analyze patterns in the data. An analysis of connections between hospitals and these labs could help in developing better collaborative opportunities and future strategies for labs in all settings.

3) Design Lab Archetypes – One of the findings of this work is that there has been a great deal of variability in terms of how these labs have been designed and implemented. Which is quite expected. Building archetypes of different labs could further support efforts on examining successful models of innovation and how they are best supported.

4) QI and Innovation in Healthcare – This research has established that the links between innovation and improvement are sometimes misunderstood by those working in hospitals and other healthcare organizations. While both terms are used interchangeably at times, without a clear definition of each it may impact upon the ability of the change leader to succeed. More study should be done on the interaction of people and methodologies between these two domains, and how they might be best supported in healthcare organizations.

5) Evidence on Impact of Design in Healthcare – It has been noted numerous times in this work that design is enabling successful outcomes locally but it is not being published as frequently. Healthcare exists in an academic environment and more publications would enable the sharing of knowledge related to design methods in healthcare and the impact that it is achieving.

6) Strategic Design – Further exploration into the use of design at the systemic and strategic level would enable its use. Studying where design has enabled strategy and systems thinking in healthcare would better support the rationale for its use.

7) Health Design Lab Canvas – This tool is a prototype as it currently exists. If health design leaders find utility in its use, the tool may be a way to share approaches towards using design in hospitals and other healthcare organization. It is licensed under Creative Commons to share and use. Its hoped that this may become a prototype that is tested and iterated on as design advances in its maturity and use in healthcare settings around the world.

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Appendix A - Interview Consent

Expert Interview Participant Consent Form

Thank you for your interest in participating in an interview as part of this major research project (MRP). Please review this consent form and discuss any questions you may have with Sean Molloy, the Principal Investigator.

Format

The semi-structured interview will take place via telephone and will last roughly 45 - 60 minutes. You will be provided with the interview questions and topics as part of the consent process and in advance of the interview.

Identification

You have the choice of whether you would like your participation to be anonymous or revealed as part of this research. The final report may include direct quotes from participants and compare approaches to innovation used at different design labs around the world. Should you not wish to be identified, please include this information below.

Withdrawing from the Project

Your participation in this interview is entirely voluntary. You may refuse to participate or may withdraw from the interview at any time. You may refuse to answer any question that you do not wish to answer. You may withdraw your data by contacting Sean Molloy via email (sm14ef@student.ocadu.ca) by December 31, 2017.

Risks

While risks are limited, some participants may experience discomfort answering questions about their industry in an interview setting.

Benefits

When the research is completed, participants will be notified and will have access to all final reports and documents. For those interested, your name and/or organization's will be highlighted for the work you are doing in design and innovation.

Confidentiality and Anonymity

Information gathered in this interview will be published in the final MRP report. This research may also be published separately via conference proceedings or academic papers. Only the Principal Investigator will have access to the data. Upon completion of the research project, all data will be destroyed.

Any identifiers of you or your organization (names, titles, contact information) will be anonymized in the final report, unless allowed below in accordance with usage outlined in this consent form. Specific quotes and identifying information related to your organization will not be used unless permission is granted to the researchers via email.

I, the undersigned, have read the consent form and have had the opportunity to discuss the research project with the Principal Investigator.

In terms of using data collected in this interview, I consent to the following process for sharing of my data.

I wish to have identifiable information anonymized. The researcher may use information from the interview in a non-identifiable manner.
I consent to the use of my data for the purposes of this research and consent to my name and organization being identified in the final report and linked to the information shared. The researcher also may use direct quotes from my interview in the final report.

In terms of sharing your participation in this research, I consent to the following release of information regarding my participation:

I do not want my participation shared. I want to remain anonymous.

I am comfortable with my participation being shared. I allow the following identifiers to be published in the final report:

First name

Last name

Title at organization or company

Organization or company name

Should the researcher develop case studies for the final report or in future research, I would be interested in participating.

Participant's Signature: _____

Date: _____

Full Name: Estee Neuwirth, Senior Director, Innovation & Design, Kaiser Permanente

Telephone Number: _____

Appendix B - Interview Guide

Introductions

Hello, my name is Sean Molloy. I am a Master of Design student at OCAD University in Toronto. Thank you for agreeing to participate in this interview. Our conversation should last no longer than 45-60 minutes.

During this interview, we will discuss the evolution of your design and innovation practice at X. We will also talk about your impressions of where you see your work evolving and its place in the context of the innovation ecosystem in healthcare.

Interviewer to revisit contents of the Interview Participant Consent Form.

Do you have any questions before we begin? (Allow interviewee to ask questions)

Semi-Structured Interview

The interviewer will go through the following questions with the interviewee:

1. Demographics

a. Please confirm that your title is XYZ.

b. Please provide a brief description of what your organization does?

c. How large is your organization? (I.e.) # of beds, # of staff/physicians, operating budget, catchment area. etc.

d. Can you please explain briefly what your role entails and how long you were in this role? How long you have been with this organization more broadly?

2. Design Lab Characteristics

a. What is the name of your design/innovation lab?

b. When was it started, where is it located in the organogram and where is it physically located within the organization?

c. How big is your team and what is the skill mix of individuals on the team?

d. Does your lab have a mission statement or manifesto?

e. What is the rationale and motivation behind the creation of your design lab?

f. What is the focus of your design-based innovation agenda? I.e.) Service design, business model innovation, process innovation, product innovation, systems innovation? IE, do you focus on a specific patient population or issue (such as aging, mental health, cancer)?

g. How internal vs externally-oriented are you?

h. How are you funded?

i. Where do you source your talent?

j. How do you define innovation?

3. Outcomes

a. Is the design lab delivering results in line with expectations in its original business cases?

b. What have been the outcomes associated with its use?

c. What have been the largest challenges?

d. What barriers to adopting and scaling changes have you experienced for innovations created at your lab or in partnership with your lab?

e. Has the design lab demonstrated results that justify investments in its sustainability?

f. What methods or measures do you use to evaluate success?

4. Design Lab in the Context of the Organization You Work In

a. How do different levels of organizations engage with the design lab? (Front line to Board, different staff members or clinicians)

b. How do leaders and users of design labs define the differences between QI and Innovation? Are their views aligned?

c. How are patients involved in your work / processes? Clinical staff? Other departments – IT, finance, HR, communications, research, etc.

5. Design Lab in the Context of the broader Health System You Work In

a. How does your lab interact with the external health system?

b. How does your lab partners with external companies/organizations? i.e.) Tech, vendor, art, design etc.

c. Does your lab scale innovations outside of your health center?

6. Next Steps/Future Thinking

a. What social, economic, political, technological, environmental, and/or values based trends in your industry and elsewhere are shaping the future of the work that you do?

b. What do you see as the next steps in the use of human centered design in health care more broadly? In what other ways may it be used? What other methodologies might it be used with?

c. Where/ how do you see the mandate or work of your design lab evolving in the next 1-3 years?

d. What is your advice to others or major lessons learned from your experience using design in healthcare?

Follow Ups - Would it be possible for you to share documents/articles/websites/reports or other things that came up in the discussion?

Clarifying Questions

• Can you expand on that?

• Can you provide any additional details or examples?

Concluding Statements

Thank you for participating in this interview. I will remind you that you can contact me at any point between now and December 31, 2017 to retract anything that you shared in this interview or to withdraw entirely.

I will share the transcribed notes of this interview for your reference. I will also share back anonymized data from other interviews once all are complete.

Appendix C –Design Labs Interviewed

Canada

Baycrest Innovation, Technology and Design Lab, Toronto, ON

– Bianca Stern, Executive Director

Emily Carr Health Design Lab, Caylee Raber, Director, Health Design Lab

Healthcare Human Factors Lab, UHN, Toronto, On – Joe Cafazzo, Executive Director

OCAD University Design for Health Lab, Kate Sellen, Director, Design for Health Program

Saint Elizabeth, Toronto, ON – Erik Landriault, Director, Innovation

UHN Open Lab, Toronto, Ontario – Tai Hyunh, Creative Director

United States

Carolinas Health System Innovation Engine, Raleigh, NC

– Ann-Somers Hogg, Director of Innovation

Cedars-Sinai Medical Center, Los Angeles, California – Joseph Castognia, Associate Director, Human Centered Design

Centre for Care Innovations, Oakland, California – Laura Blumenthal,

Program Manager, Innovation

Connected Health Innovation – Partners HealthCare, Boston, MA – Jodi Sperber,

Senior Scientist, User Centered Design

Design Institute for Health, Dell Medical School, University of Texas, Austin – Stacey Chang,

Executive Director

Health Design Lab @ JeffInnovation, Philadelphia, PA

– Robert Pugliese, Associate Director

IDEO, Palo Alto, CA – Dennis Boyle, Partner

Independence Blue Cross Center for Innovation, Philadelphia, PA – Michele Histand,

Director of Innovation

Innovation and Design Lab, University of California, Santa Cruz – David Yager, Founder and Director

Kaiser Permanente Design Consultancy, Oakland, California – Estee Neuwirth, Senior Director, Innovation and Design

Mayo Clinic Center for Innovation, Rochester, MN – Dr. Doug Wood, Medical Director

MD Anderson Innovation Centre, Houston, TX – Denise Worrell, Director of Human Centered Design, Innovations

Penn Medicine Center for Health Care Innovation, Philadelphia, PA – Matt Van Der Tuyn, Manager, Design and Strategy

Sibley Innovation Hub, Sibley Hospital, Washington, D.C. – Frankie Abralind, Experience Designer

SPARK Health Innovation Lab, University of Utah – Jim Agutter, Director and Founder

Sutter Health Design and Innovation, Palo Alto, California – Megan Moyer, Manager

University of Vermont Medical Center Design Lab – Jeremy Beaudry, Lead Healthcare Experience Designer

VA Center for Innovation, Washington, DC – Andrea Ippolito, VA Innovators Network Director

Europe

Center for Innovation, Karolinska University Hospital, Stockholm, Sweden – Anna Thies, Senior Healthcare Service Designer

Centre for Connected Health, Oslo, Norway – Jonathan Romm, Designer

Experio Lab, Karlstad, Sweden – Tomas Edman, Head of Operations

Helen Hamlyn Center for Design at the Royal College of Art, London, UK – Jonathan West, Research Fellow

HELIX Centre, London, UK – Gianpaulo Fusari, Senior Designer

Lab4Living, Sheffield Hallam University, Sheffield, UK – Paul Chamberlain, Design Director

Australia and New Zealand

Design for Health and Wellbeing Lab, Auckland, NZ – Steve Reay, Co-Director

Health Collab, Monash University, Melbourne, Australia – Daphne Flynne, Director

** Interviews in scope for this analysis are in bold*

A map to all participants in this research is found here - https://drive.google.com/open?id=1WPLi_j9nJ4WtKdNCjjtLl4bDe-x-ZtDD&usp=sharing

Appendix D – The Health Design Lab Canvas

The Health Design Lab Canvas

Key Partners

Key Questions

1) Who are your key partners and collaborators?

2) What are the motivations for partnerships?

3) Do the partnerships enable your value proposition?

Consider

- Internal partners, external partners.
- What structures are needed to partner?
- How will you add value to each partnership?
- Are you doing QI or Innovation or both?

Key Activities

Key Questions

1) What activites does the lab's value proposition require?

2) What activities are most important with regards to customer relationships and revenue streams?

Consider

- What is your design focus and innovation ambition?
- What is your design maturity in terms of practices?

Key Resources

Key Questions

1) What key resources does the lab's value proposition require?

2) What resources are most important to customers and revenue streams?

Consider

- What is your design focus and innovation ambition?
- What is your design maturity in terms of practices?

Value Proposition

It is recommended that the Value Propoisition Canvas (Osterwalder, 2014) be used for anyone looking to set up their own design practice or lab. (https://strategyzer.com/canvas/value-proposition-canvas)

Consider

- If the insights of this research were put into a singular description, the core value proposition of a hospital based design lab is:

The Health Design Lab will challenge the hospital and its people to re-imagine the health experience by creating and scaling innovations that improve the health experience and outcomes.

- The Ambition and Maturity model presented earlier in this research may also be used as a tool to consider the lab's ambition as part of its value proposition.

Customer Relationships

Key Questions

1) What will be the most meaningful relationships with your customers?

2) How might the lab enable meaningful relationships with its customers?

Consider

- What design experiences do you create?
- What does a relationship with the lab feel like?

Channels

Key Questions

1) Through what channels or venues will your customers be reached?

2) What channels will be the most meaningful to your customers

Consider

- How do virtual and digital channels play a role in your design engagements and lab?

Customer Segments

Key Questions

1) Who are customers and which ones are you creating value for?

2) Who is your most important customer?

Consider

- Who are you designing with?
- Who are you designing for?

Cost Structure

Key Questions

1) What is the cost structure of the lab?

2) How are costs linked to impact?

Consider

- What are your fixed and variable costs?
- How are you paying for design talent? I.e.) Full time, part time, contract, students?

Revenue Streams

Key Questions

1) What is the revenue structure for the lab?

2) How does this revenue link to strategy? Is there a match between funding and intent?

3) What is the distribution of revenue streams? Does one stream dominate?

Consider

- Do you need to diversify your revenue base?
- How much freedom does your lab have in choosing revenue options?

Appendix E – The Ambition and Maturity Model